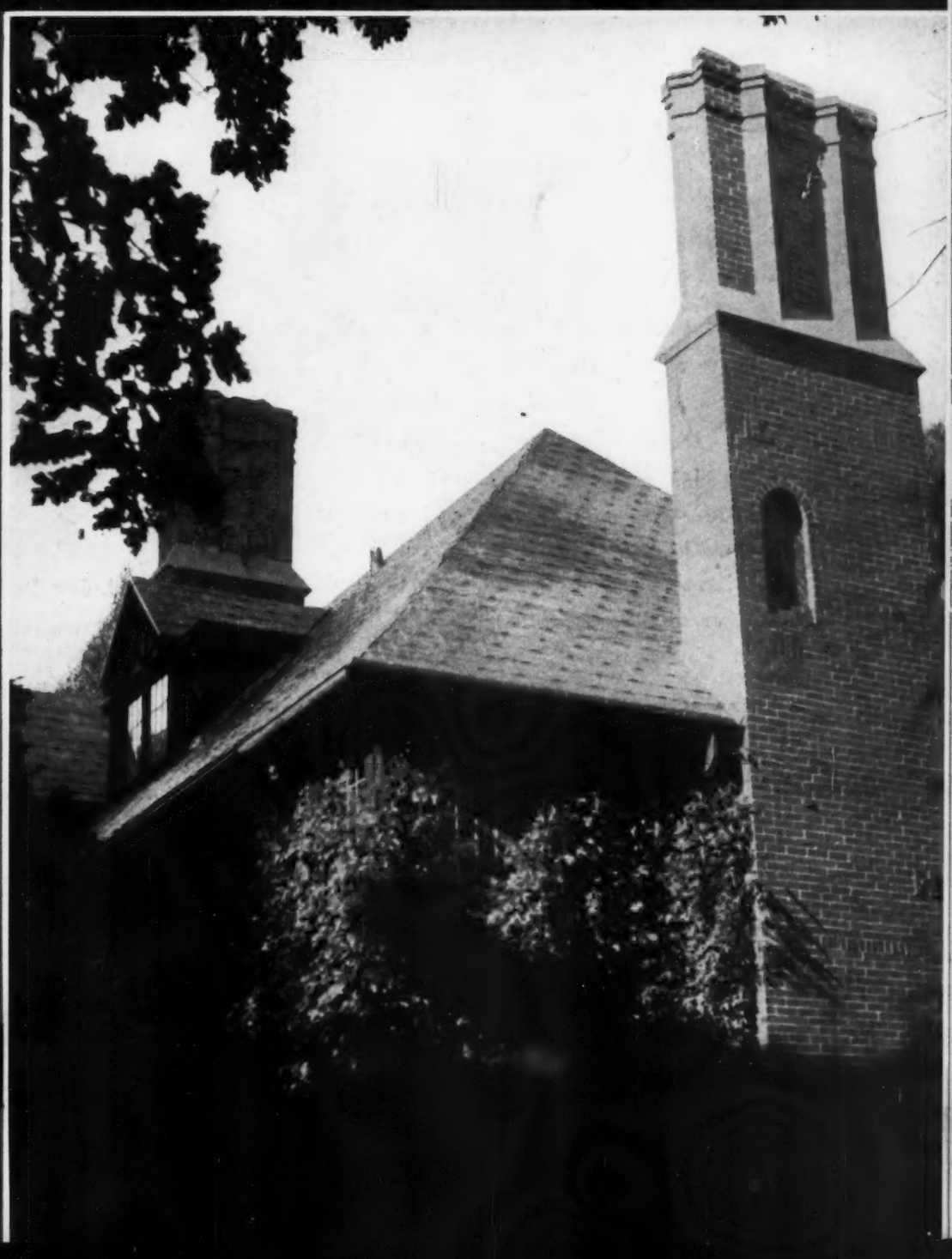
AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING



AIR CONDITIONING SECTION
PAGE 47

ESTABLISHED 1880
OCTOBER 1938

LAMNECK
PREFABRICATED DUCT

Quality that Keeps Pace with the Advance of Air Conditioning

● Lamneck quality sets the standard for present day Prefabricated Duct and Fittings and Gravity Furnace Pipe and Fittings. The reason is that the Lamneck Simplified System is engineered and manufactured to meet the exacting requirements of the leaders in the production of warm air heating and air conditioning units.

To keep Lamneck products in pace with the steady advance of air conditioning, Lamneck engineers study not only the best practice of today but keep abreast of the newest trends and developments which will determine what is to be the approved equipment of tomorrow. They also are constantly seeking the counsel and cooperation of the best warm air heating and air conditioning engineers.

The result is a perfection of design and superiority of workmanship which insure a product of maximum efficiency, attractive appearance and economy.

This same high standard of Lamneck quality extends also to Lamneck service features which have been developed to aid dealers, jobbers and manufacturers in the sale and installation of Lamneck Simplified Prefabricated Duct and Fittings. In these features, too, Lamneck leads the field because they represent the fruit of painstaking study and sympathetic understanding of the problems of the industry.

If you are not familiar with these service features write today for a complete set which will be furnished gladly without charge or obligation.

LEADERS FOR 21 YEARS IN FURNACE PIPE, FITTINGS AND REGISTERS

LEADERS FOR 4 YEARS IN PREFABRICATED DUCT

LP INC.

LAMNECK PRODUCTS, INC.

414 DUBLIN AVENUE • COLUMBUS, OHIO

PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

This MOTOR pays Double Dividends

Quiet, resiliently mounted G-E motor for air-conditioning equipment

HELPS SELL NEW CUSTOMERS

HERE is Dividend No. 1: A prospective home builder, for example, comes into your store to inspect your domestic-heating and residential air-conditioning equipment. To him, appearance is no indication of the quality of the important parts of your units—he must judge by the reputation of the manufacturers who made the parts.

This is where G-E motors help you, for they are assurance to prospects that the electric parts of your units are dependable. Impartial surveys indicate that the public prefers G-E motors. This acceptance, added to the acceptance of your units, reduces your sales problem largely to that of convincing prospects of the economies and comforts of modern equipment.

BRINGS BACK OLD CUSTOMERS

DIVIDEND No. 2 is future sales to satisfied customers. These customers return to buy other devices and to replace old equipment. They also tell the newlyweds next door about you, and thus give you first chance at prospects who are just beginning to buy.

G-E motors give the service that satisfies users—they perform quietly year after year with little or no attention. Every design is tested in actual service before being adopted, and in addition to the many tests that the parts must pass during manufacture, every G-E motor is given a two-hour running test before shipment. G-E motors do their part to make your customers satisfied. General Electric, Schenectady, N. Y.

LET G-E MOTORS HELP YOU SELL

GENERAL ELECTRIC

070-262

In This Issue

THE light weight copper roof shown on this month's cover was photographed in Madison, Wisconsin, where the sheet metal and warm air heating firm of Reinick and Krueger is introducing this type of roof to local home owners and builders. An article on page 32 describes the roof and supplies complete details of application.

★

Last year FHA stopped guaranteeing home modernization loans. This past spring the loan and guarantee plan was renewed until next spring, but meanwhile an increasing number of agencies inaugerated loan plans of their own. This trend has focused attention upon the various forms of time payment plans. A survey of popular plans is published on page 35 from information supplied by equipment manufacturers, finance houses and others.

★

Following the publication last month of part one of our article on designing an ear seed corn drier, we were asked why this attention to a field of activity which by its very nature is bound to be limited. We believe that drying of field crops will soon be a major activity for many contractors because more and more grains or plants are being artificially dried. We thus improve on nature. The problems of design and operation call for a new technique. Hence these articles. See page 40.

★

Every once in a while (although probably not so frequently as formerly) there bounces out of California a new idea. One which has earmarks of popularity is sidewalk advertising. It happens, also, that the sheet metal contractor takes a hand in this idea as illustrated by the article on page 44, describing such a sidewalk billboard—made possible by a sheet metal contractor's ability to form intricate designs.

★

Much favorable comment has been received during the last year on Mr. Neubecker's series of patterns for air conditioning fittings. That this series was badly needed has been brought out in letters from readers who declare that these articles are the first to cover the small size fittings used in residential work. Mr. Neubecker has outlined numerous future patterns, but readers may suggest patterns they would like to see developed.

★

Those contractors located in areas where "good" stoker coal is hard to get should be interested in the report (part 2) on page 63 pointing out the troubles and benefits of stoker firing using a poor coal.

AMERICAN ARTISAN

With which is merged

FURNACES and SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor — Brewster S. Beach, Consulting Editor

Vol. 107, No. 10 — October, 1938 — Founded 1880

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Member of Audit Bureau of Circulations—Member Associated Business Papers, Inc.

Published monthly by Keeney Publishing Company, 6 North Michigan Ave., Chicago. Branch Offices—In New York, Room 1734, Grand Central Terminal Building, Murray Hill 2-8293; In Cleveland, 2128 Rossmoor Road, Cleveland Heights, Yellowstone 1540; In Los Angeles, J. H. Tinkham, 1406 S. Grand Ave., Richmond 6191.

Copyright 1938 by Keeney Publishing Company—F. P. Keeney, President; W. J. Osborn, Vice President; R. Payne Wettstein, Secretary; Chas. E. Price, Treasurer. Advertising staff: Wallace J. Osborn, R. Payne Wettstein, Robert A. Jack, J. H. Tinkham, L. A. Doyle.

Yearly Subscription Price—U. S. and possessions, Canada, Mexico, South America, Central America, $2.00; Foreign, $4.00. Single copies, U. S. and possessions, $.25. Back numbers, $.50. January, 1938, Directory issue, $1.00 per copy. Entered as second-class matter, July 29, 1932, at the post office at Chicago, Illinois, under the act of March 3, 1879.

More than 8,000 Copies of this Issue are being distributed

#35 MONEL HELPS YOU BRING IN THE ORDERS

...and GET THEM OUT

Already a favorite with users, #35 Monel is an easy metal to fabricate

IMMEDIATE ACCEPTANCE by hotels, restaurants, hospitals and other institutions, by leather, textile, chemical and other industrial plants has already been accorded the new #35 Monel.

Possessing greater resistance to wear, denting and deformation, this new sheet also provides a bright, attractive satin finish. Produced at the mill by modern methods and equipment, every sheet is *uniform in appearance.* What's more... though the new #35 sheet replaces the standard cold-rolled Monel sheet with #8 finish, *it is lower in price.*

No wonder #35 Monel is *easier to sell!*

Working qualities? There's where you get another big break:

Because cold working has been standardized to produce greater flatness and hardness, bruising during forming and handling is lessened. The new #35 sheet lock seams without bulging, and forms neat, crisp joints. In addition, #35

Monel is easy to weld or solder... *and you don't have to polish it.*

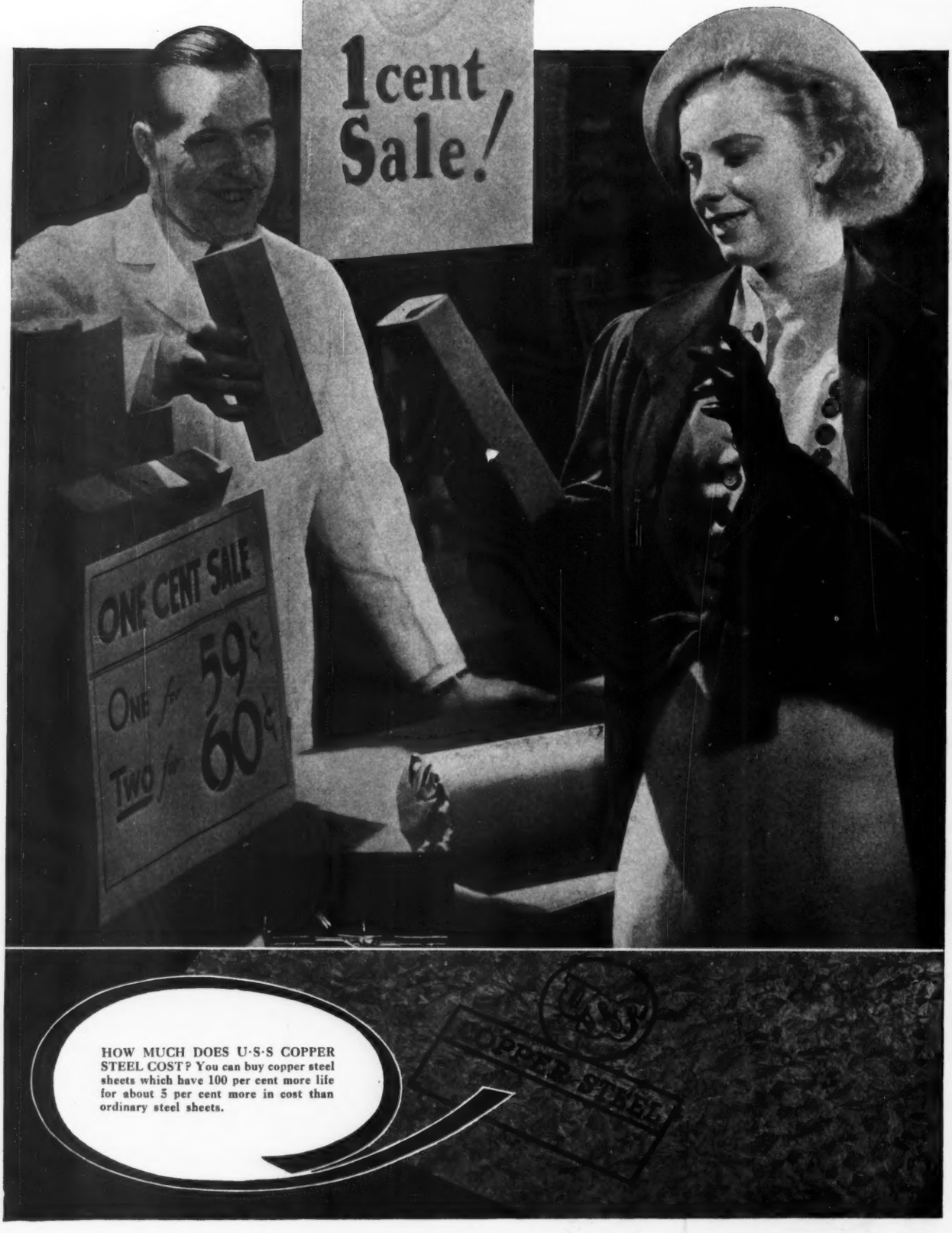
Write us for further information and complete working instructions.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N. Y.

MONEL

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

Double Value


1 cent Sale!
ONE CENT SALE
ONE for 59¢
TWO for 60¢
HOW MUCH DOES U·S·S COPPER STEEL COST? You can buy copper steel sheets which have 100 per cent more life for about 5 per cent more in cost than ordinary steel sheets.
USS
COPPER STEEL

for a "Copper"

. . . and a little copper doubles the value of steel

ONE cent sales have been remarkably successful because they give double value. Any customer can see that twice the amount of a product lasts twice as long.

In the steel industry, it is a "One cent sale" every time you buy U·S·S Copper Steel—for copper steel lasts more than twice as long as plain steel, yet it costs but little more.

When a product must be protected against rust at low cost, build it of U·S·S Copper Steel. For heating and air conditioning systems and equipment, this metal has proved to be the best obtainable. It not only lasts longer but it keeps fabrication costs down.

U·S·S Copper Steel is easy to work in both black and galvanized sheets. It can be readily formed, welded, drawn, cut and soldered.

Order U·S·S Copper Steel Sheets from our distributor in your territory. He can give you quick deliveries of all standard sheets.

EASY FORMING SAVES TIME. U·S·S Copper Steel Sheets are being made softer and more ductile for better workability.

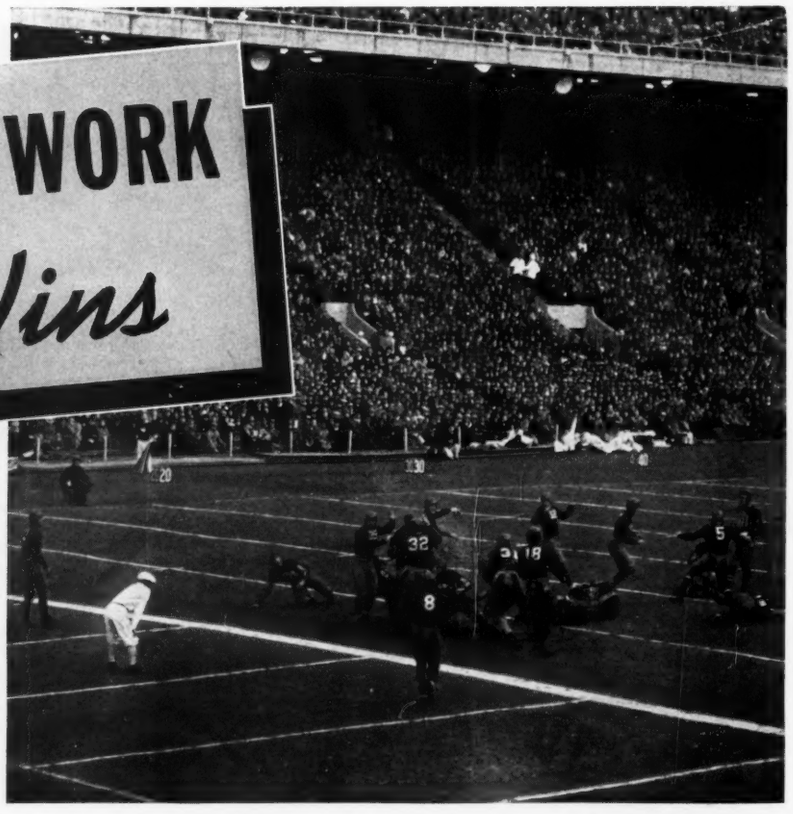
SEVERE BENDING is possible with U·S·S Tight Galvanized Sheets. You can be sure that every sheet bearing the U·S·S label will roll easily without fluting or flaking.

U·S·S COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

It's TEAM WORK THAT Wins



Asphalt—roofers
Blowers
Canvas
Ceiling—steel
Conductor Pipe
galv. steel, Armco iron, copper, 40 lb. terne
Controls
automatic heating
Eaves Trough
see conductor pipe
Fans
furnace, exhaust, propeller
Furnace Pipe and Fittings
Furnaces
Grilles
Gutter, O. G.
see conductor pipe
Hangers
eaves trough and gutter
Hooks
conductor pipe and flashing
Humidifiers
Machinery
hand, foot and power
Nails
Paints
tinner's red and house paints
Paper
asbestos, red rosin, building, asbestos mill board
Registers—warm air
Ridge Roll
Roofing
asphalt in rolls and shingles, felts, asbestos siding, roofers supplies coatings
Roofing and Siding
galv. steel, Armco iron, copper, ternes
Roofing Ternes
40 lb. and 25 lb. in IX and IC
15 lb. and 8 lb. IC roll tin IX and IC
Screws—sheet metal
Sheets
aluminum, steel, iron, copper, zinc, stainless, long terne, enameling
Sheets (Corrugated)
Sheets
(Perforated)
Sheets (Plated)
chrome and nickel plated zinc, copper, tin and steel
Siding
galv. and painted
Solder and Fluxes
Tin Plate
charcoal, cokes, imported dairy, roofing ternes
Tools
every kind used in sheet metal
Ventilators
roof and fan
Welding
equipment and supplies; both arc and gas

Sports are played hard today. So much so, in fact, that the man who reaches his goal seldom is able to do it alone. It takes hustle and brains, plus good teamwork, to win.

The same rule holds good for the sheet metal business. Good men alone are not enough. But, team-up these men with the kind of tools and materials they deserve and they will turn out jobs to be proud of . . . ones which win customers every time.

Where to get these materials and equipment when everyone today is claiming better quality and greater value? Thousands of sheet metal men will answer this question by saying, "Buy from OSBORN". Their reason for this, of course, is that we have been a dependable team-mate to the trade for more than three-quarters of a century.

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO • CLEVELAND • DETROIT

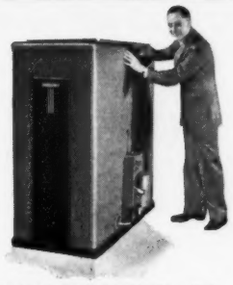
A DEPENDABLE SOURCE OF SUPPLY FOR 79 YEARS

END THE "COLD FLOOR" PROBLEM
Now and Forever!

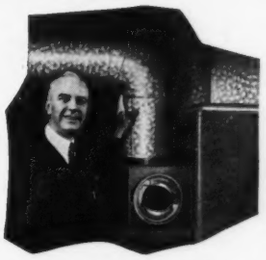
Warm air rises to the ceiling—cold air settles to the floor, unless prevented by constant forced circulation such as used with Superfex.

OF COURSE you can't expect people to follow heat to the ceiling in order to escape cold, drafty floors.

FOR CONTINUOUS COMFORT in the "LEG ZONE," warm air must circulate at the floor, too. Cold air must be drawn off.

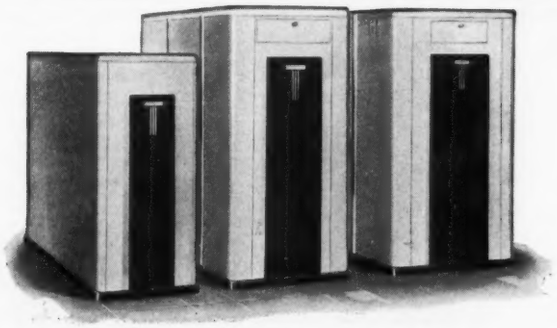


SUPERFEX HAS THE ANSWER: It's continuous air flow supplied under synchronized high-low control of both burner and blower, provides real 24-hour air conditioning.



LOWER STACK TEMPERATURE—Better than 80% efficient. No heat wasted in reheating the system. High fire burns for shorter periods.

SO QUIET you must listen closely to the Superfex to hear any sound—result of perfected combustion and hushed blower mountings.



COMPLETE UNITS for every size of home. Smallest shipped assembled (will clear average doorway). Capacities at registers vary from 65,000 to 140,000 B.t.u.'s.

EVERY HOME BUILDER will want a Superfex with these all-important advantages (1) 24-hour air conditioning—not just the average 8. (2) elimination of cold, drafty floors.

SUPERFEX

The Mark of Quality

OIL BURNING

AIR CONDITIONING FURNACE

A PRODUCT OF PERFECTION STOVE COMPANY

SEND FOR FREE BOOKLET

PERFECTION STOVE COMPANY
7900-J Platt Avenue, Cleveland, Ohio

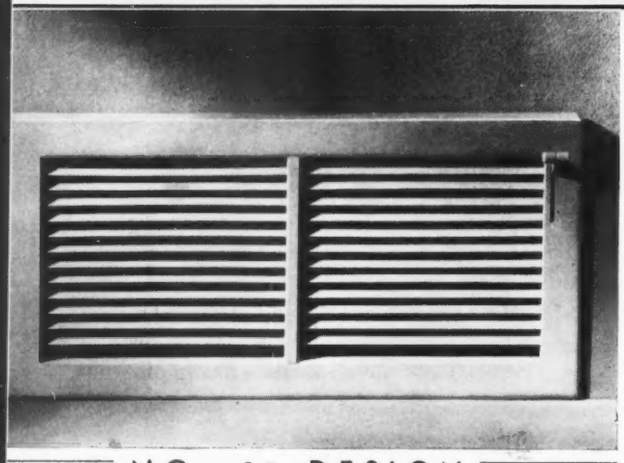
Send along your free book describing SUPERFEX Warm Air Conditioning Furnaces.

Name_____

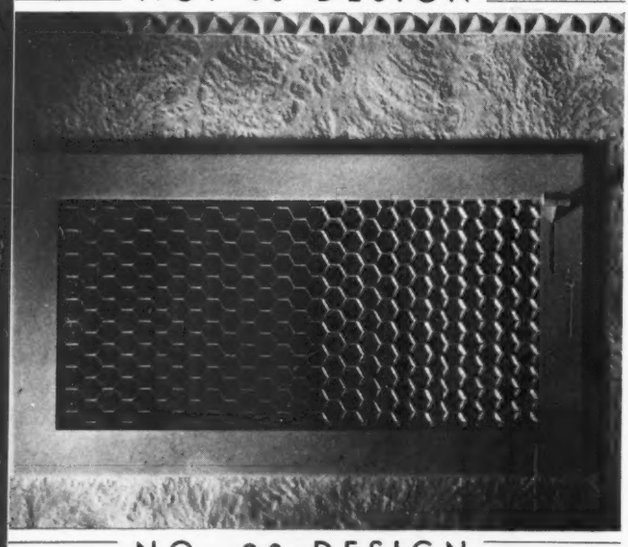
Street_____

City_____ State_____

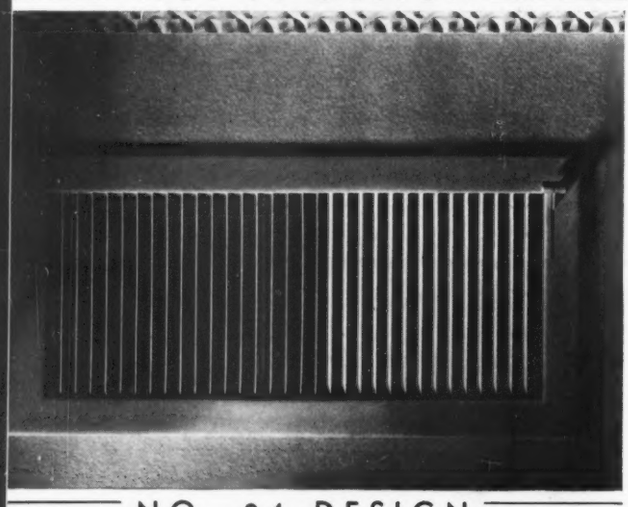
H&C Air Conditioning Grilles and Registers from The QUALITY Line



NO. 85 DESIGN



NO. 90 DESIGN



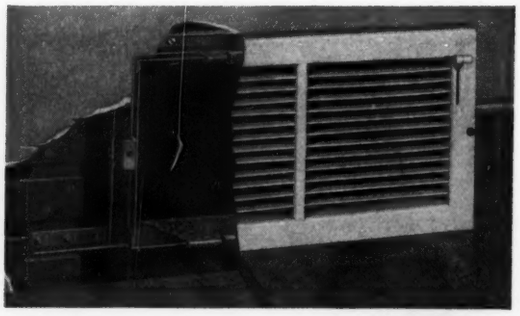
NO. 84 DESIGN

QUALITY without price premium is found throughout the entire H & C line of Air Conditioning Grilles and Registers. From the simplest, most economical installation to one requiring the utmost in air distribution, the line offers a design to meet all requirements of price and performance.

Compare the sturdy constuction, the careful workmanship, the excellence of finish, the careful packaging, and you will see why H & C is the preferred line of Air Conditioning Registers.

You can't go wrong by joining the constantly increasing number of leading installers who look to H & C for their requirements in Air Conditioning Grilles and Registers. See the line at your H & C Jobber.

No. 37AC Air Conditioning Catalog, containing a very helpful section on engineering information, will be sent on request.



AN INSTALLATION EMPLOYING THE H & C No. 8 BASEBOARD STUD FRAME

Installations made with this frame are bound to be secure, tight and permanently streak-proof. Frame is completely embedded in plaster. Sponge Rubber Gasket forms air-tight connection with frame. Stackhead may be formed over inner member of frame or firmly clamped between inner and outer members. Frame is equipped with plaster and trim gauges. Fastens directly to studs. For either supply or returns.

HART & COOLEY MANUFACTURING CO.

Warm Air Registers
Damper Regulator Sets
H&C
Air Conditioning Grilles
Dampers, Chain, Pulleys

61 W. KINZIE STREET, CHICAGO, ILLINOIS

ENGINEERING OFFICE AND FACTORY · HOLLAND · MICH·

Fire a Furnace—Me?

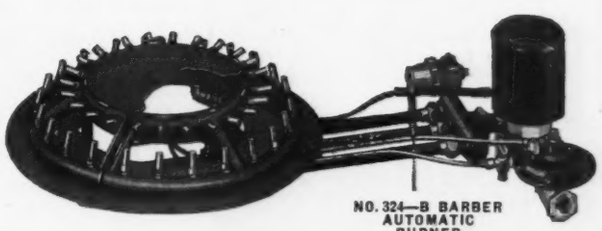
No, I'm no lollypop—but I have my rights and one of them is the right to AUTOMATIC GAS HEAT. Dirt and ashes for the gals who still want to bear that yoke! I'll take mine with GAS!

●

Your customers—of the "gentler sex" especially—will respond to that kind of sales appeal. The emancipation of American womanhood from the coal-shovel-and-ash-can brigade is proceeding rapidly. Women *want* gas—why not talk their language? Show them how easy and reasonable in cost it is to convert their present coal-fired heating equipment to clean, dependable GAS heat—with a BARBER Burner.

●

The "B" Model shown comes in 8 sizes for round grates 12" to 34" in diameter. There is also a wide range of sizes for oblong grates. Patented BARBER Jets insure complete combustion, with a "scrubbing" flame aetion on walls of firebox. No fire brick or refractory elements needed. Baltimore Safety Pilot. Listed in A. G. A. Directory of Approved Appliances. Ask for Catalog and Price List on Conversion Burners for Furnaces and Boilers, Burner Units for Gas Appliances, and Gas Pressure Regulators. We supply sales folders, at your request, for mailing to your customers.



NO. 324—B BARBER AUTOMATIC BURNER

●

THE BARBER GAS BURNER COMPANY

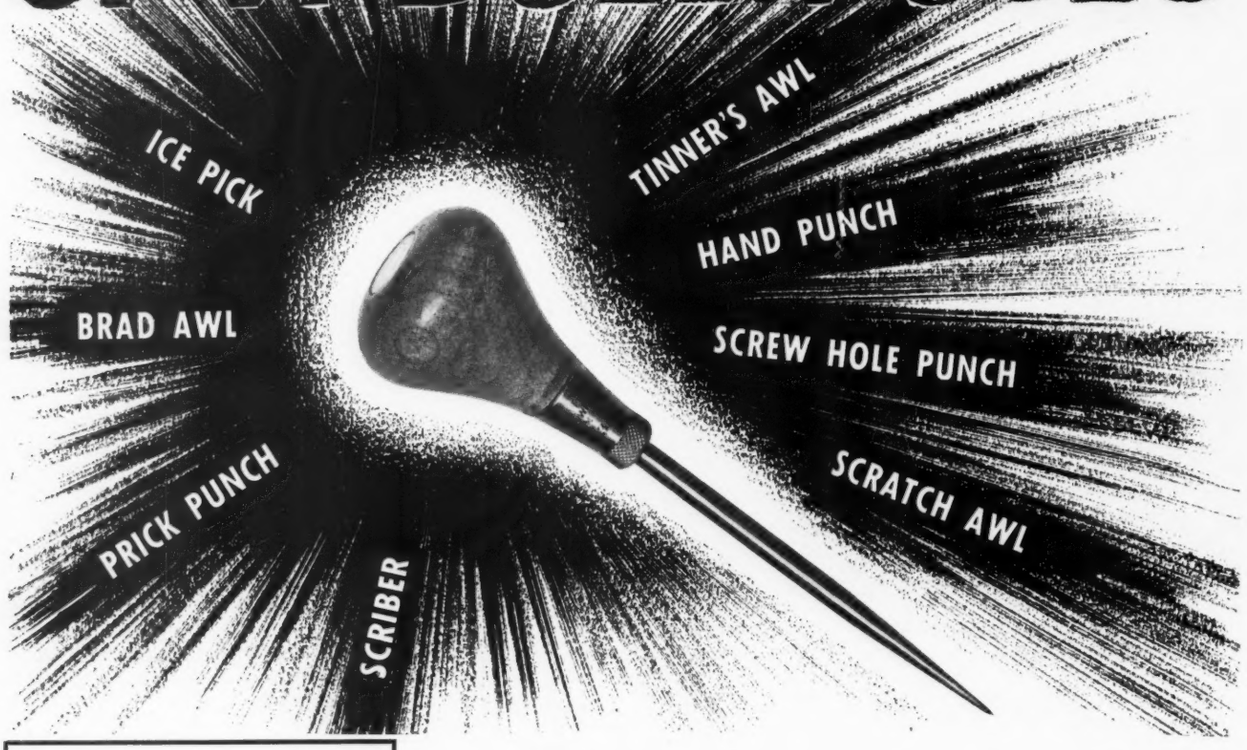
3704 Superior Avenue
Cleveland, Ohio

●

Address Michigan Inquiries to
The Barber Gas Burner Company of Michigan
4475 Cass Ave., Detroit, Michigan

BARBER *Automatic* JET GAS BURNERS

THE TOOL OF A DOZEN USES



Easier Cutting SNIPS

The Crescent Snip line includes 4 patterns — 12 sizes—in Conventional, Circular-Cutting, Combination, and Heavy Duty types. You will find an easier cutting Crescent pattern for every type of service. All fully guaranteed—all popularly priced.

Here's a simple little tool of many, many uses—scribing, punching, aligning screw and rivet holes, etc., etc. Not JUST an ordinary Scratch Awl . . . but a business-like tool that sheet metal workers really respect. You have to see it and use it to appreciate its workmanlike quality and wide utility. The handle is natural-finished hard maple securely locked to the blade; the tool-steel blade is hardened full length and can be resharpened; it extends clear thru the handle and is capped flush to insure a smooth grip; the knurled ferrule is turned from a solid bar of steel and forced on the blade under pressure. Overall length is 6⅝ inches.

Order a supply of No. 73 Scratch Awls today. Retail price is only 35 cents. Your Sheet Metal or Hardware Distributor can supply you.

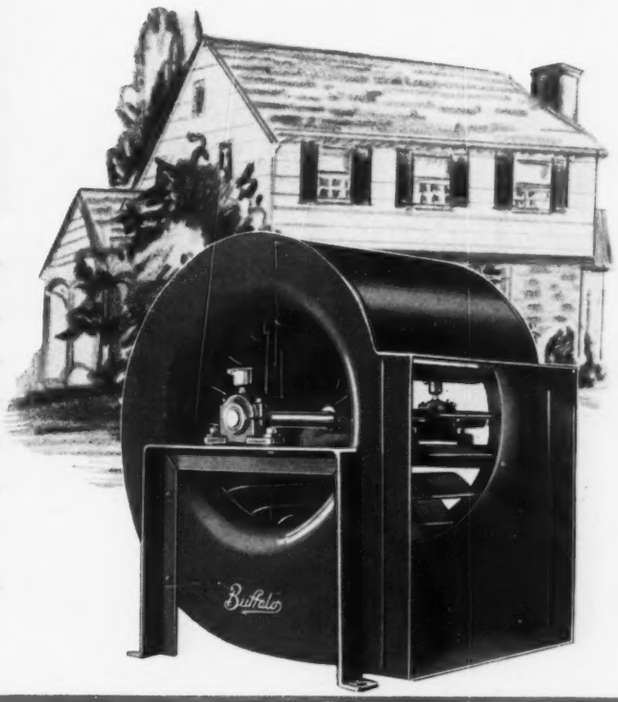
CRESCENT TOOL CO., JAMESTOWN, N. Y.

CRESCENT and Smith & Hemenway TOOLS

Use These "Buffalo" FANS

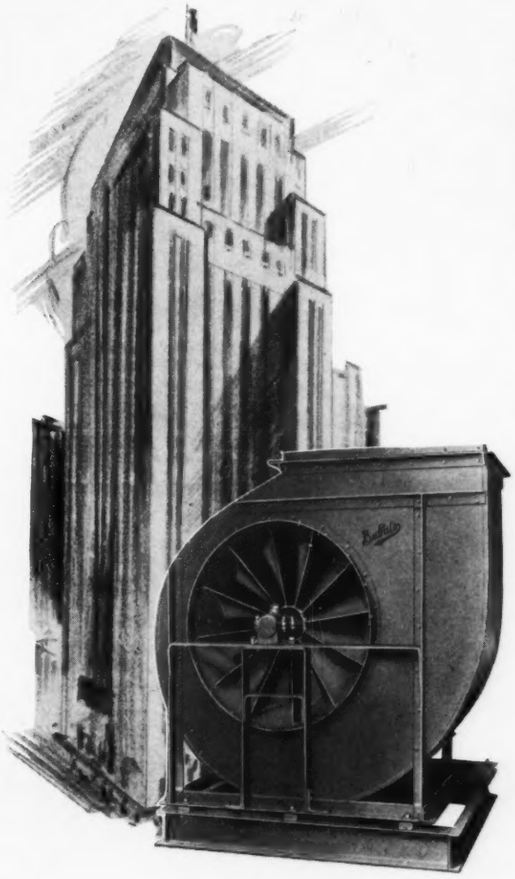
for QUIET OPERATION, HIGH EFFICIENCY

For Home Heating "HVA" FANS



• The fan that has truly made QUIET forced warm air heating a reality. Bearings are floated on rubber insulators completely isolating the rotating parts from the housing. Here is a fan that costs little to operate, will give many years of trouble-free service and is easy to install.

Complete details in our Bulletin 3044. Write for it today.



For Large Ventilating Jobs Limit-Load FANS

• Ventilating systems in large buildings must be dependable—and quiet. Therefore, the fans you install in this important work should leave nothing to chance. Buffalo Limit-Load Fans are specifically designed so they cannot overload and burn out motors. All rotors are dynamically and statically balanced. Blades are curved at just the right angle for top efficiency and quiet operation.

There is no ventilating job that Buffalo Fans cannot handle. Our 60 years experience is at your service. We believe it will pay you well to use it often.

Write for Bulletin 2955.

BUFFALO FORGE COMPANY

497 BROADWAY BUFFALO, N. Y.

Branch Engineering Offices in Principal Cities

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ontario

"Recent Improvements have Revolutionized Automatic Heating"

—YOUR HEATING DEALER

ADVERTISING DEPARTMENT

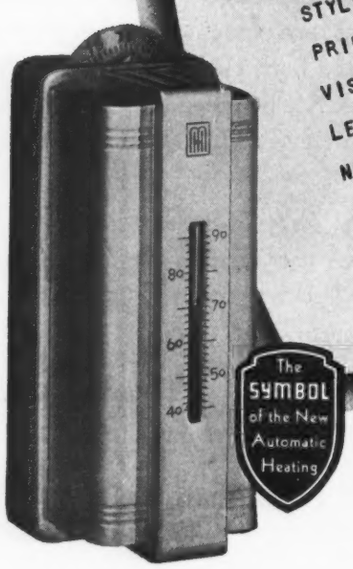
This ad is the first of a series in the Saturday Evening Post and Time Magazine. It will be read by millions of prospects for Automatic Heating.

GRAM

MR. AND MRS. HOME OWNER
EVERYWHERE

I'D LIKE TO TELL YOU ABOUT RECENT OUTSTANDING IMPROVEMENTS IN AUTOMATIC HEATING. THESE IMPROVEMENTS PLUS THE NEW AUTOMATIC CONTROL SYSTEMS DEVELOPED BY MINNEAPOLIS-HONEYWELL ARE ESSENTIAL TO TRULY MODERN AUTOMATIC HEATING. SMARTLY STYLED M-H THERMOSTATS, WITH THEIR EXCLUSIVE HEAT ACCELERATED PRINCIPLE, NOW SEEN ON WALLS OF HOMES EVERYWHERE ARE VISIBLE SYMBOLS OF MODERN CAREFREE INDOOR COMFORT. LET ME EXPLAIN HOW EASILY YOU CAN INSTALL AND PAY FOR THIS NEW TYPE AUTOMATIC HEATING AND THE NEW MINNEAPOLIS-HONEYWELL CONTROLS WHICH ARE AN INSEPARABLE PART OF ITS OPERATION. FOR COMPLETE HEATING SATISFACTION THIS WINTER, SEE ME NOW.

YOUR HEATING DEALER.



MINNEAPOLIS-HONEYWELL

BROWN INDUSTRIAL INSTRUMENTS
NATIONAL PNEUMATIC CONTROLS
Control Systems

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY, MINNEAPOLIS, MINNESOTA

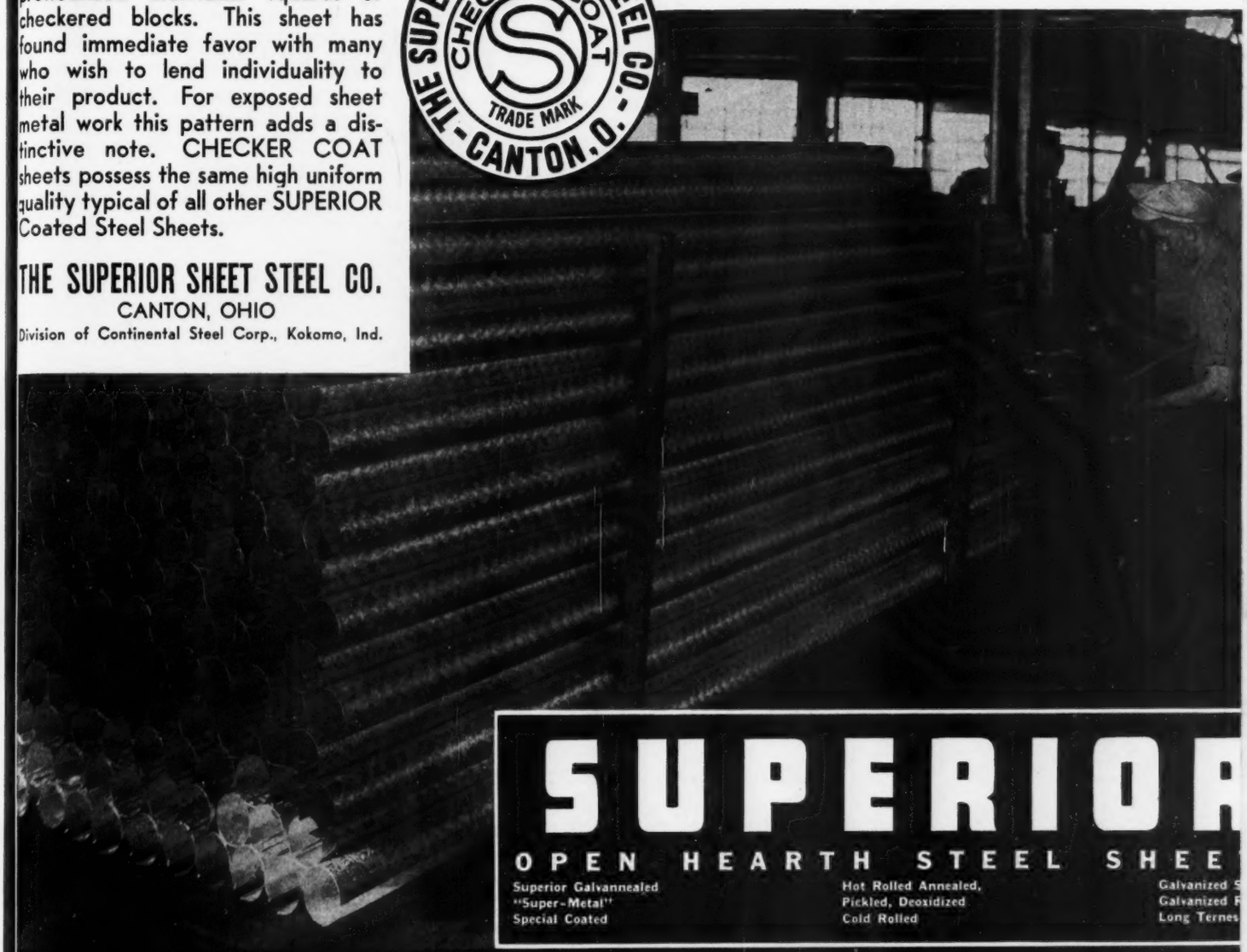
Distinctive Pattern

IN GALVANIZED SHEETS

• SUPERIOR CHECKER COAT is a Galvanized Steel Sheet with a distinctive bright bloom or spangle in pronounced individual squares or checkered blocks. This sheet has found immediate favor with many who wish to lend individuality to their product. For exposed sheet metal work this pattern adds a distinctive note. CHECKER COAT sheets possess the same high uniform quality typical of all other SUPERIOR Coated Steel Sheets.

THE SUPERIOR SHEET STEEL CO.
CANTON, OHIO
Division of Continental Steel Corp., Kokomo, Ind.

THE SUPERIOR SHEET STEEL CO. - CANTON, O. - CHECKER COAT TRADE MARK



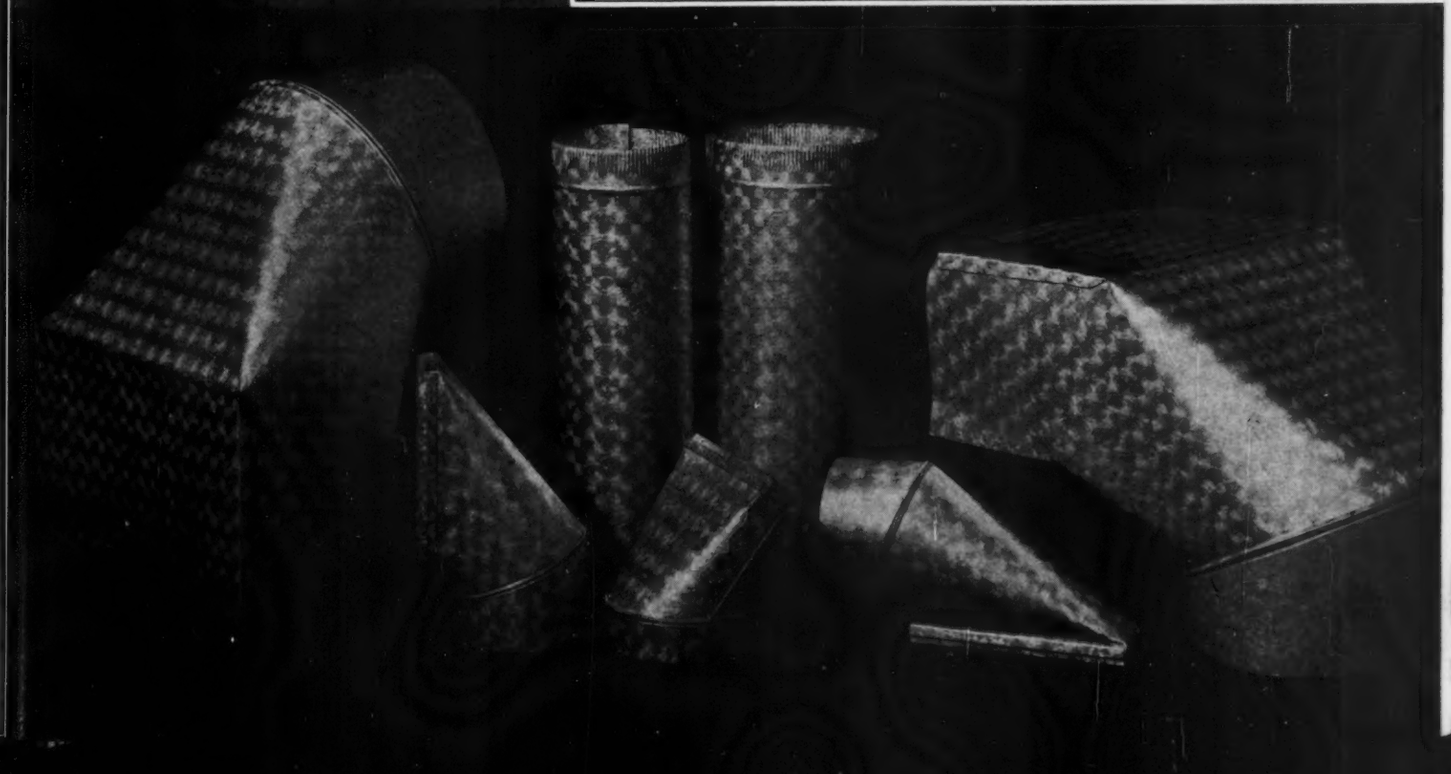
SUPERIOR

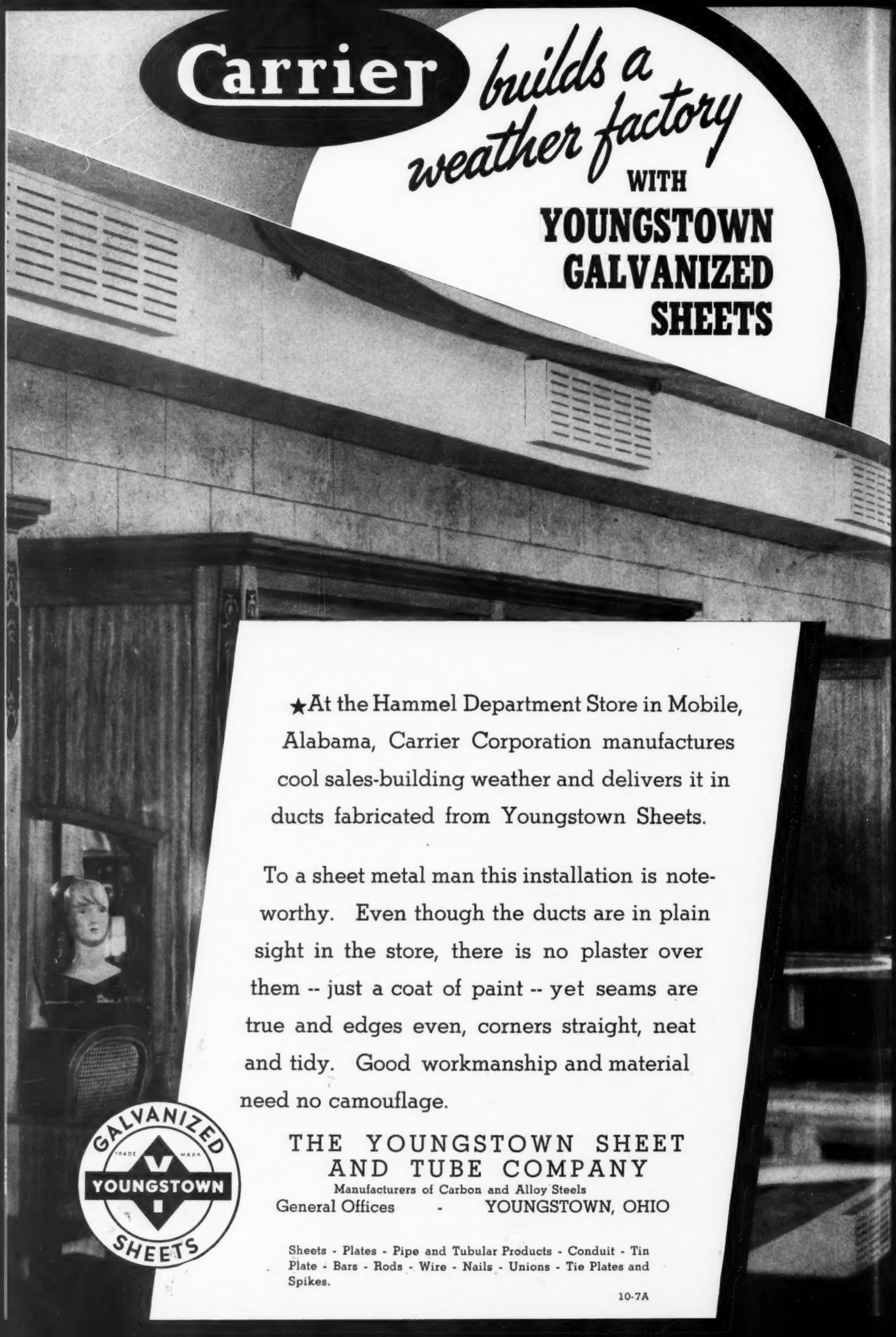
OPEN HEARTH STEEL SHEE

Superior Galvannealed
"Super-Metal"
Special Coated

Hot Rolled Annealed,
Pickled, Deoxidized
Cold Rolled

Galvanized S
Galvanized R
Long Ternes





★At the Hammel Department Store in Mobile, Alabama, Carrier Corporation manufactures cool sales-building weather and delivers it in ducts fabricated from Youngstown Sheets.

To a sheet metal man this installation is noteworthy. Even though the ducts are in plain sight in the store, there is no plaster over them -- just a coat of paint -- yet seams are true and edges even, corners straight, neat and tidy. Good workmanship and material need no camouflage.

GALVANIZED TRADE MARK YOUNGSTOWN SHEETS

THE YOUNGSTOWN SHEET AND TUBE COMPANY

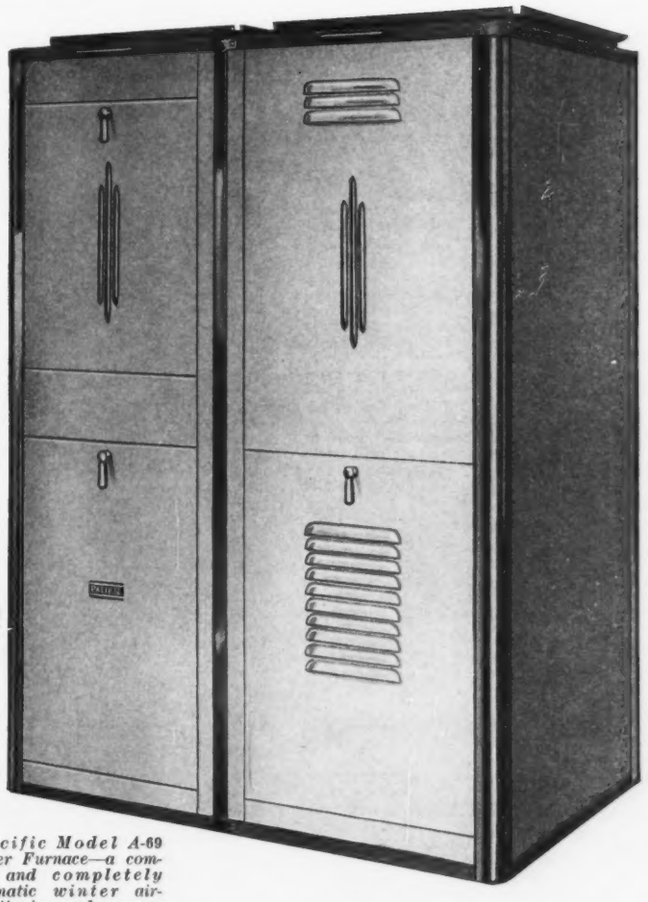
Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods - Wire - Nails - Unions - Tie Plates and Spikes.

10-7A

Proved SELLING FEATURES MAKE THESE Pacific GAS FIRED FURNACES *"DEALER FAVORITES"*

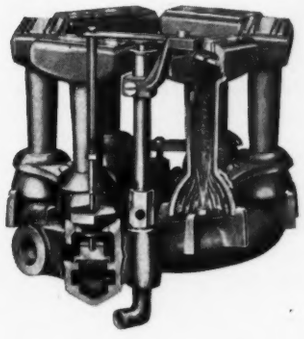


Pacific Model A-69 Blower Furnace—a compact and completely automatic winter air-conditioning and summer ventilating unit for basement, recreation room, service porch or closet.

Join the "Profit Parade" of dealers all over the country who are making real money selling Pacific Gas Heating Appliances. The two models shown on this page are good ones to start with. Pacific's twenty-five years of manufacturing and engineering experience in the gas-heating field is your assurance that these furnaces are of highest quality and are properly designed. Their exclusive SELLING FEATURES insure a ready sale and complete customer satisfaction that endures for years to come.

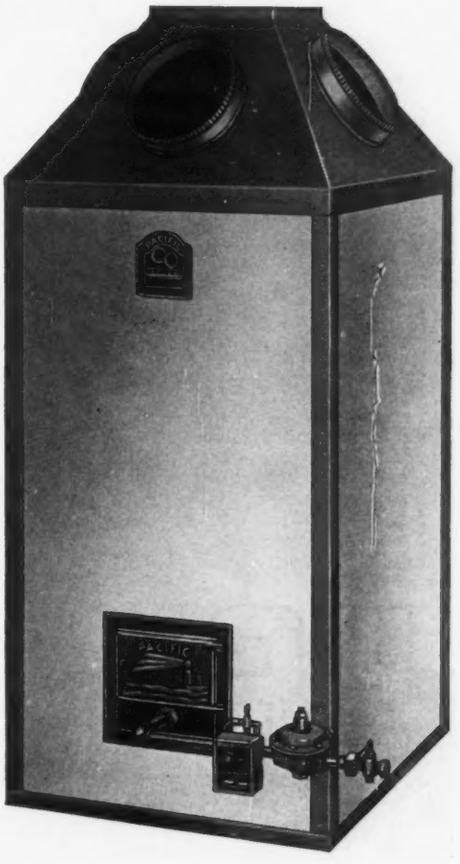
You, too, can make money selling the Pacific line of efficient gas heating appliances. Write today for Catalog and the liberal Pacific dealer plan.

THE PACIFIC MULTI-TUBULAR BURNER CLINCHES SALES



The World-Famous Pacific Multi-Tubular burner consists of several small individual blue flame bunsen burners—each having its own independent air and gas supply mixed in exactly the right proportions for MAXIMUM FLAME TEMPERATURE and GREATEST FUEL ECONOMY.

Since the air-gas mixture on each individual burner tube is accurately and scientifically proportioned at the factory, no further air adjustments are required. This eliminates service calls and guards your profit. The Pacific Multi-Tubular burner operates continuously at the highest efficiency obtainable from the available gas fuel supply—the result is MORE HEAT at LESS COST —this means lasting customer satisfaction.

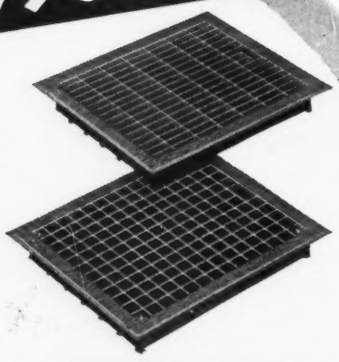


Pacific Model B-13 Furnace with exclusive all-steel round heating element. For gravity or fan-forced warm air heating.

Pacific

GAS RADIATOR COMPANY
1740 W. Washington Blvd., Los Angeles, Calif.

for GRAVITY JOBS

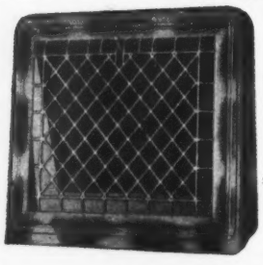


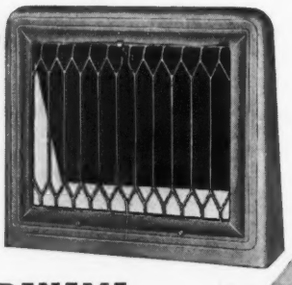
U. S. TRUSSTEEL

The U. S. Trussteel Floor Register (top) with its patented bar suspension insuring snug fit, heel-proof spacing and its natural photographic wood grain finish sets a new high standard of craftsmanship in Welded Bar-Construction registers.

U. S. STEEL EMBOSSED

The U. S. Steel Embossed Floor Register—"world's strongest"—with its natural photographic wood grain finish is favored everywhere for jobs demanding a really serviceable register of smooth appearance and adequate capacities.





NATIONAL **PANAMA**

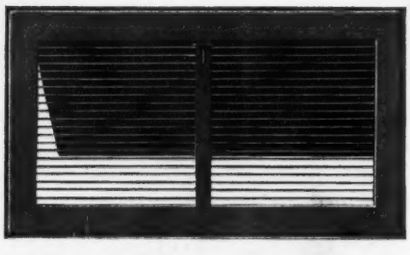
National Baseboard Registers are ideal with neat diamond lattice design. The Panama Baseboard Register is the most popular of all Bar-Type Registers.

If your aim is to build a reputation for quality installations, then the extra careful workmanship on U. S. Registers and Grills will be most significant. Fortunately, our special production equipment and 38 years of manufacturing experience enable us to supply you with products of extra merit at Lowest market prices.

for AIR CONDITIONING

SENSATIONAL NEW LOUVER-STAMPED DESIGN

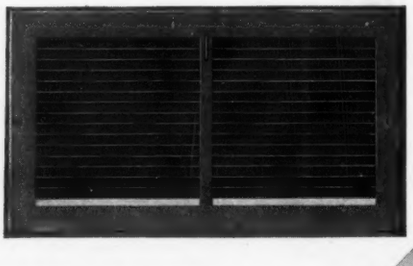
There's never been anything like this new line of Air-Conditioning Registers with their Inset Panels for directional flows. It's the most flexibly adaptable register ever produced. Get complete details.



Inset Panels should be applied to Louver-Type and Adjustable-Bar Registers for Right and Left Directional Flows.

U. S. ADJUSTABLE-BAR REGISTERS

Can be adjusted without marring Finished Face-Bars. Operating Key does not touch Finished Bars. Specially adaptable to Combination Heating and Cooling Installations where 60° Deflection Up or Down is required.



Write today for Latest prices on U. S. Gravity Registers and very Recent Broadside on U. S. Louver-Type and Adjustable - Bar Registers, illustrating and explaining the Sales-Making and Stock-Saving features of U. S. Inset Panels.

US

UNITED STATES REGISTER CO.

BATTLE CREEK, MICHIGAN

MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.

Here's a ripe field you can reap with the ----

TRANE *Projection* UNIT HEATER

Three Trane Projectors in a Detroit, Michigan, Kresge Store. Architect: Charles N. Agree. Engineer: A. F. Caughey. Contractor: Greenbaum and Weisman.

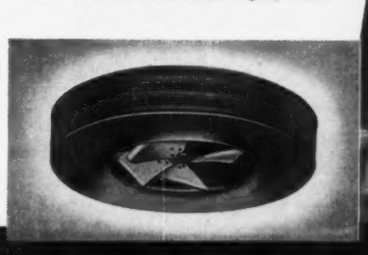
Exclusive Features of Trane Unit Make it as Easy to Sell in Stores and Offices as it is in Factories and Shops.

Note the three trim Projection Unit Heaters in the illustration above. Out of the way. Good to look at. Saving money for the owner by salvaging ceiling heat. Projecting heat to the floor to counteract cold drafts at the doors. Real selling points for you to use.

In the illustration at the right the Projection Unit Heater might easily be mistaken for an ornamental light. Offices and stores have a right to demand unobtrusive units—out-of-the-way units—units that cut heating costs by using heat ordinarily wasted at the ceiling.

Only in the Trane Projection Unit Heater will you find these exclusive features. Only in new Trane Bulletin S327 will you find the kind of sales aid you need to make these Projectors as easy to sell to stores and offices as they are in factories and shops.

Write TRANE at 2007 Cameron Ave., for Bulletin S327 today.



Projection Unit Heater in the Rochester, New York, office of the John Hancock Life Insurance Company. Feinburg Plumbing & Heating Co., Contractor.

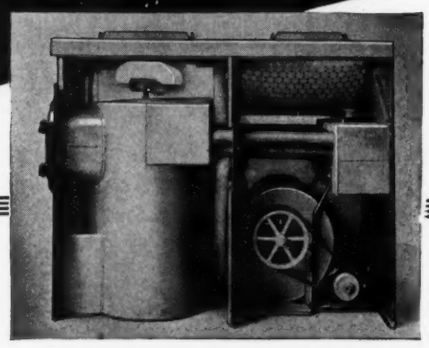
TRANE

THE TRANE COMPANY AIR LA CROSSE, WISCONSIN

Also TRANE COMPANY OF CANADA LTD., TORONTO, ONTARIO

Unit Heaters - Specialties - Convectors - Climate Changers - Cooling Coils - Unit Coolers - Blast Coils - Unit Ventilators

Fitzgibbons
Special - 80
Directaire



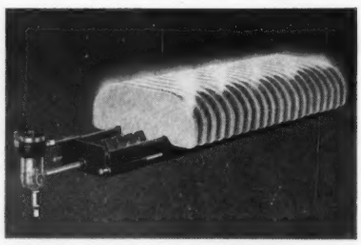
FITZGIBBONS
Uses only **AUTOMATIC JUNE**

You Can Make MORE MONEY

SELLING CONDITIONERS EQUIPPED WITH "AUTOMATIC JUNE"

★ There comes a time, in every furnace sale, where the prospect wants to talk about humidification. This can be the point where you step in with all guns blazing or it can be the point where you dodge and duck. It depends upon whether you are selling *with* or *against* Automatic June.

Fitzgibbons is one of the prominent manufacturers who is selling *with* Automatic June and doing a very fine job of it. Customers are rapidly realizing that proper humidification means "not too *little* and not too *much*." Only Automatic June completely fills the requirement.



Automatic June has everything—compact capacity, fool-proof operation, *and graduated control.* It is impossible for the house to get "too little or too much."

If you are handling a line equipped with Automatic June you need not fear any competition from the standpoint of scientific humidification.

If you are *not,* we will be glad to send you complete information on Automatic June and a list of the manufacturers offering it as standard and optional equipment.

MONMOUTH PRODUCTS CO.
General Offices and Factory
1933 E. 61st St.
CLEVELAND, OHIO

AUTOMATIC JUNE
GRADUATED HUMIDITY CONTROL

yes—THERMOSTATS DO DIFFER

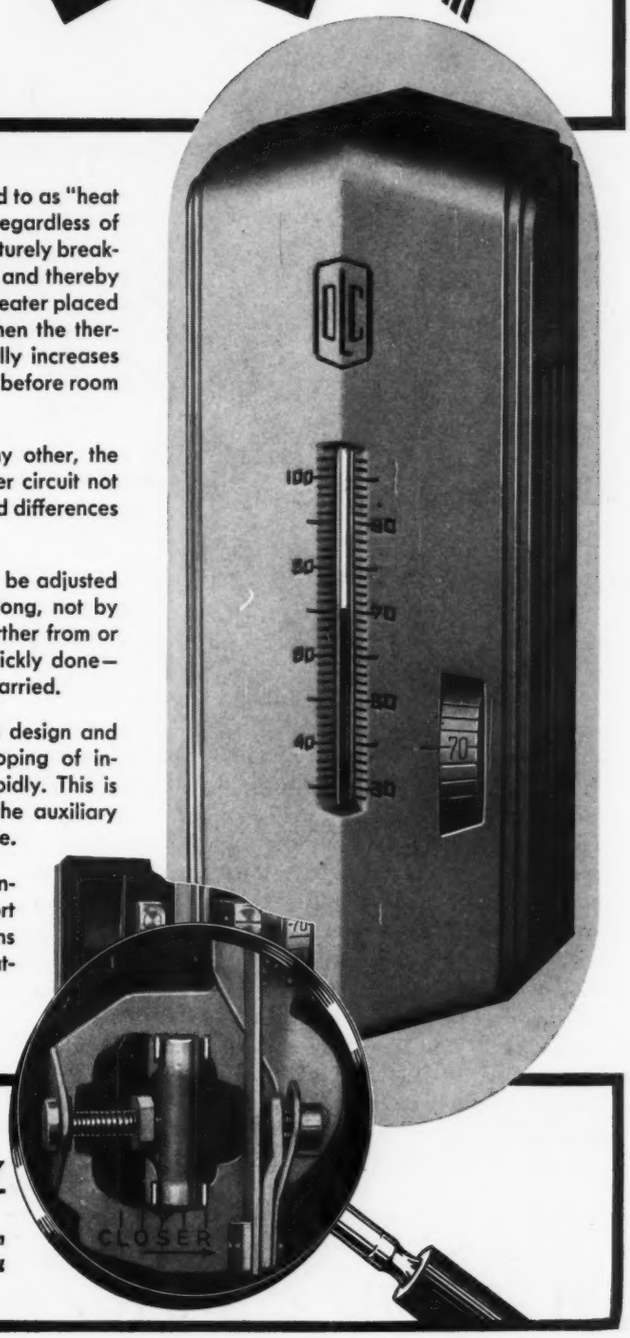
The preheater type thermostat has been variously referred to as "heat anticipating", "accelerating" and "compensating". But regardless of the terminology they all operate on the principle of prematurely breaking the load circuit in order to shorten the heating cycle, and thereby level off the room temperature curve. The small auxiliary heater placed near the bi-metal blade begins to heat up gradually when the thermostat circuit is closed. The heat thus produced gradually increases to a value which causes the blade to open the load circuit before room temperature reaches the cut-out point.

Thus far all preheater thermostats are alike. Unlike any other, the "Genuine Detroit" Two-Eleven carries the auxiliary heater circuit not in series with but parallel to the load circuit. Therefore load differences have no effect whatever on heater performance.

Unlike other thermostats of this kind, the Two-Eleven may be adjusted for any length heating cycle from very short to very long, not by replacing the heater element but merely by moving it farther from or closer to the bi-metal blade. This is easier and more quickly done—and no large stock of graduated heater units need be carried.

Again unlike other units, the Two-Eleven, because of its design and method of operation, reduces to a minimum the drooping of indoor temperature when outdoor temperature drops rapidly. This is assured by a careful balance between the output of the auxiliary heater and the differential setting of the bi-metal blade.

Because of these differences, the Two-Eleven gives considerably better performance in maintaining indoor comfort and increasing fuel economy in all types of installations regardless of building construction, exposure, type of heating plant or kind of fuel.



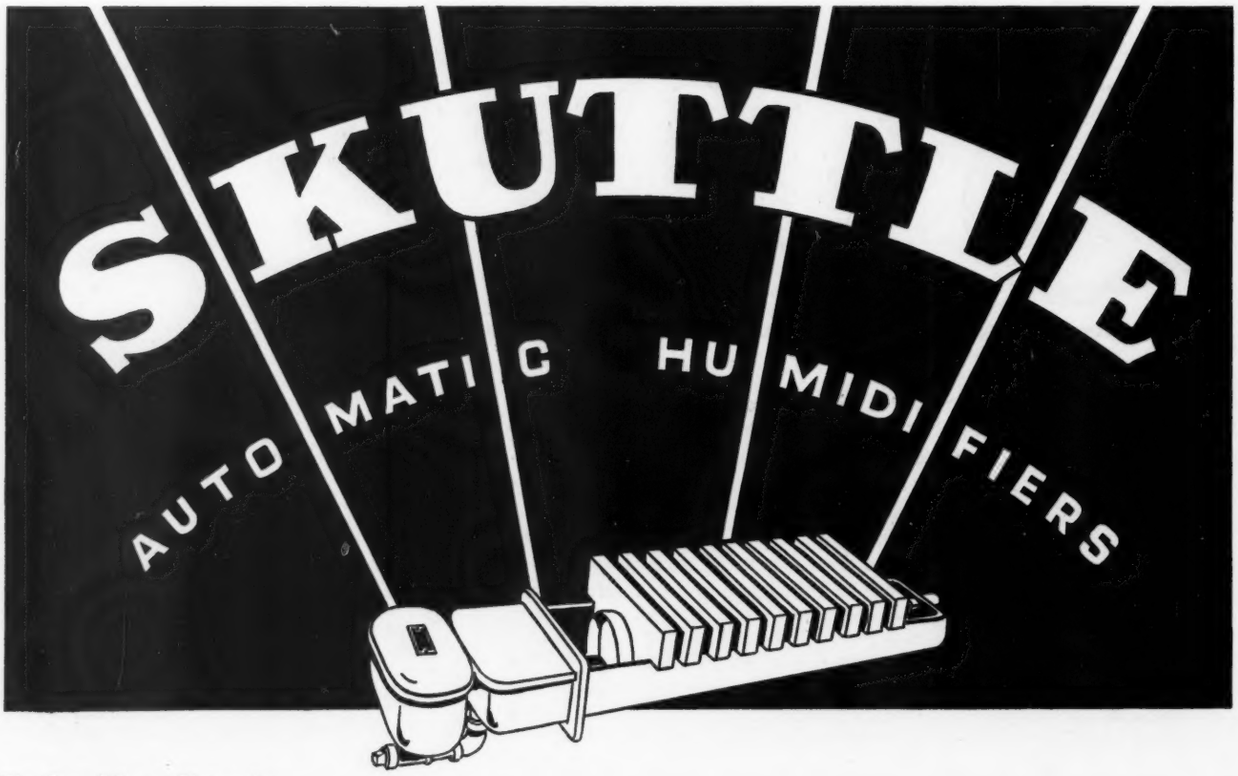
DETROIT LUBRICATOR COMPANY

General Offices: DETROIT, MICHIGAN

Division of American Radiator & Standard Sanitary Corporation

Canadian Representatives: Railway & Engineering Specialties Ltd., Montreal, Toronto, Winnipeg

A LETTER OF 21 YEARS of SERVICE IMPORTANT FACTS



To Our Many Friends:

This year marks the twenty-first consecutive year in which Skuttle humidifiers have been manufactured and sold. If it is possible to "come of age" certainly Skuttle humidifiers so qualify through consistent improvement of a reliable line of products over a long span of years.

With but few exceptions the majority of the leading air conditioning and furnace manufacturers of the country are using Skuttle products, specified as standard equipment as designed for their line. They know Skuttle products to be dependable and trouble free in operation.

While most companies do not reveal their sales, we wish at this time to go on record as to the popularity of our products. During July and August we acquired over two hundred new dealer and manufacturing accounts. One of these months was the largest in our history and September gives every indication of being another outstanding month. Such widespread and increasing acceptance of Skuttle makes us feel that we have reached another milestone in the steady growth of our organization.

This is indeed proof that Skuttle is recognized as the leader among humidifier manufacturers. Such recognition is due to the fact that the country's leading heating contractors and dealers know Skuttle's long life and dependable operation. This plus popular prices have made them the most profitable line to handle.

Let me tell you how to increase your humidifier sales this season and enjoy greater profits. I will gladly give you full details upon request.

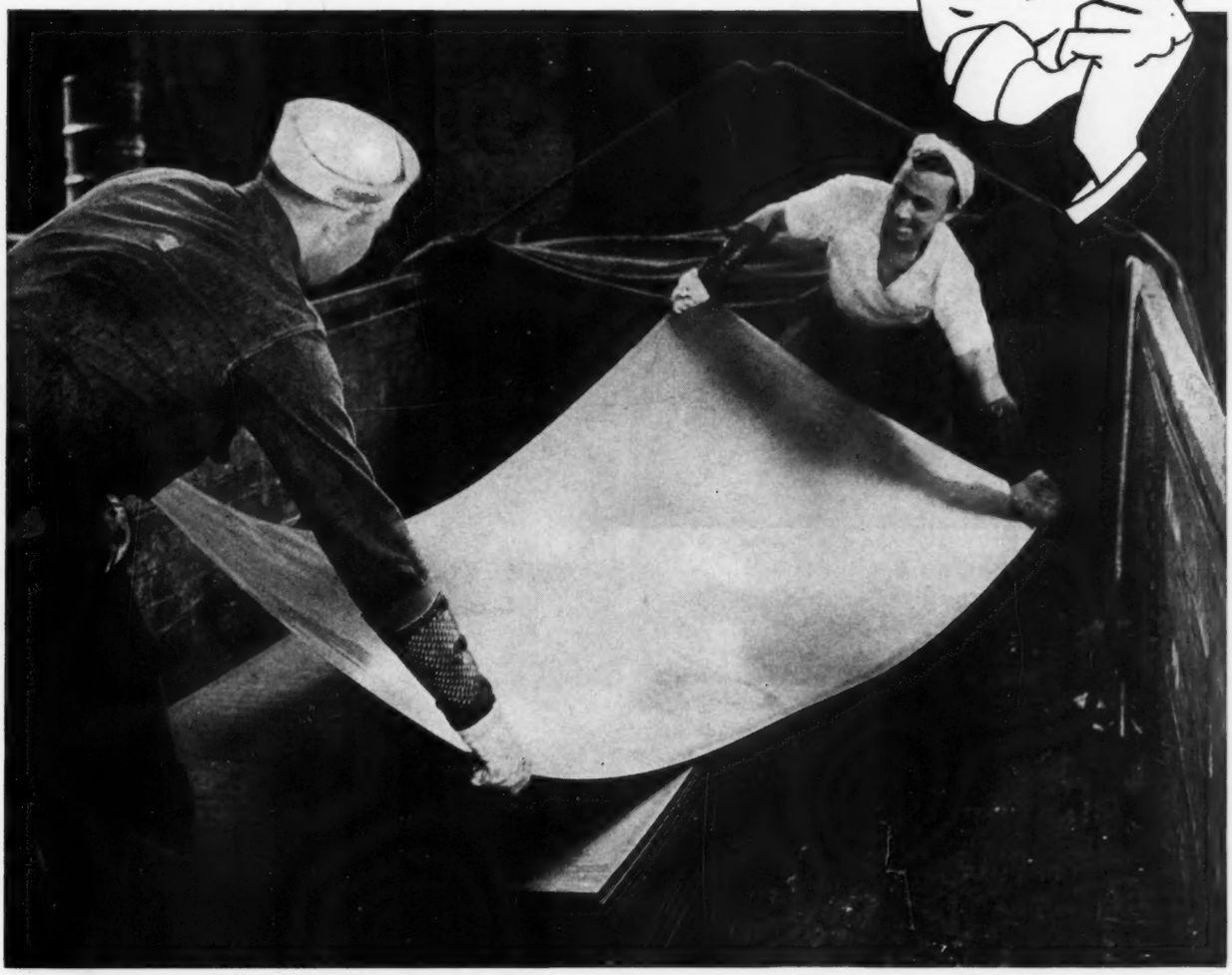
Yours very truly,

GENERAL SALES MANAGER

☆ ☆ ☆

J. L. SKUTTLE COMPANY • 999 FRANKLIN • DETROIT, MICH.

NEED SHEETS IN A HURRY?
Call the Armco Distributor



When emergencies arise and you need good sheets in a hurry, call the Armco Distributor. You'll find him equal to the occasion.

He carries ample stocks of all the commonly-used grades of iron and steel sheets. And he's organized to give you the kind of service you want. You'll find too that dealing with the Armco Distributor means more than just quick deliveries. His interest carries through to successful application of the metal and rendering of other valuable business services.

The Armco Distributor offers you the most widely-advertised name in sheet metal. Twenty-four years of national advertising has created great public confidence in the name "Armco." It is readily accepted as assurance of highest metal quality.

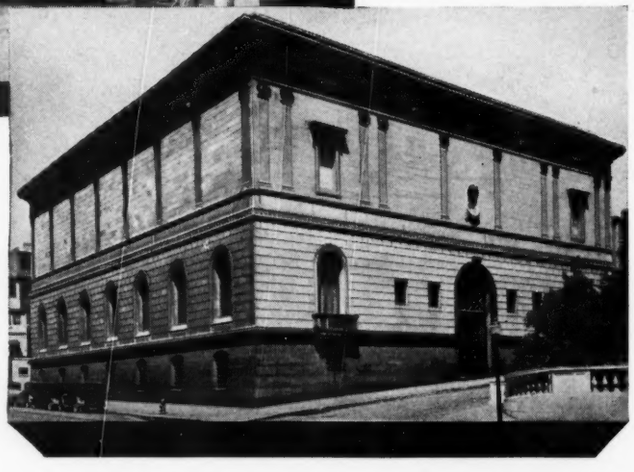
You'll like the friendly, helpful service of the Armco Distributor. Call him or his salesman for quick deliveries of ARMCO Ingot Iron, Armco Stainless Steels and plain or copper-bearing steel sheets made by The American Rolling Mill Co., 2931 Curtis Street, Middletown, O.

ARMCO SHEET METALS

A *Striking Example* OF ANTHRACITE'S ADVANTAGES OVER OTHER FUELS

● Left. *Central court of Walters Art Gallery. The white marble floors as well as priceless works of art, require the cleanliness of Anthracite heat.*

● Below. *Exterior view of the Art Gallery, where Anthracite heat was selected to preserve the building as well as the irreplaceable works of art it contains, from dirt and corrosion.*



Famous Walters Art Gallery Adopts Automatic Anthracite Heat

Heating contractors hear many opinions as to which fuel gives the cleanest heat. Here is convincing evidence on the question.

When the famous Walters Art Gallery of Baltimore, Md., was faced with the selection of an automatic heating plant, and the question of cleanliness involved the preservation of thousands of priceless art treasures, Anthracite was selected.

The gallery houses a costly collection of stained glass windows, white marble statues, rare old books, unreplaceable oil paintings and water colors, century-old tapestries, imported bronzes and Oriental ceramics. Caring for such unique creations requires a ceaseless battle against destructive elements which might stain, corrode, and ruin the delicate art objects. Such objects can not be handled vigorously and frequently for purposes of cleaning. Gallery officials, when considering the addition of automatic firing, were determined to use no fuel which might add smoke, soot or destructive elements to the air. Chimney smoke and grime, they felt, would pollute the atmosphere about the building.

As a result, Walters' authorities, knowing Anthracite is smokeless, sootless and odorless, voted for an automatic Anthracite stoker.

Cleanliness is but one of the many advantages of Anthracite in addition to its greater heat value and economy. The book "Modern Anthracite Equipment" describes the newest developments in automatic heat and air conditioning. A copy will be mailed upon request.

Anthracite Industries, Inc., Chrysler Bldg., New York

This Seal of Approval appears on Anthracite equipment only after it has passed the most rigid tests in the heating field.

Pennsylvania
ANTHRACITE
COAL

***THE* MODERN FUEL FOR SOLID COMFORT**

ONE WORD TO REMEMBER
when you want a Fan System Heat Exchange Surface that . . . HAS EVERYTHING

AEROFIN
Heat Exchange Surface

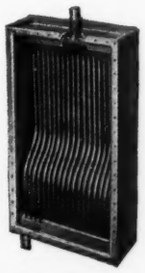
Aerofin Fan System Heat-Exchange Surface covers the entire field of heating and cooling. It embodies the most advanced features in construction and operation. It is more widely used than any other surface on the market — more than 50,000,000 feet are in service on thousands of installations.

Aerofin was the pioneer of all light-weight standardized surface and remains the outstanding leader in the field today.

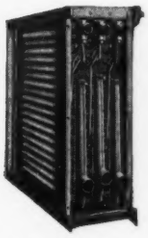
It is the development of fifteen years of continuous research by a group of specialists whose sole job has been to make better and still better equipment adapted to the practical requirements of consulting engineers, architects and contractors.

In Aerofin you'll find everything that you have always wanted in forced air heating and cooling surface, plus an engineering consultative service which assists you in applying it to your individual problem.

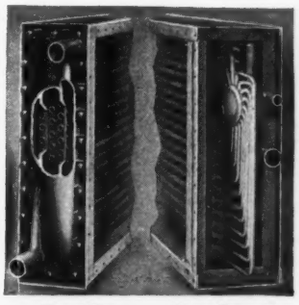
Send today for complete technical literature and take advantage of the engineering cooperation offered by Aerofin's district offices.



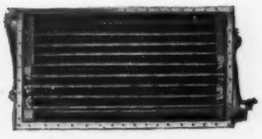
Flexitube Aerofin



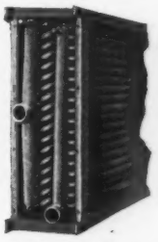
Aerofin Direct Expansion Unit



Cleanable Tube Unit with Removable Header — *Direct Expansion Unit with Centrifugal Header*



Universal Aerofin



Aerofin Continuous Tube Water Coil

AEROFIN CORPORATION

410 SOUTH GEDDES STREET • SYRACUSE, N. Y.

CHICAGO DETROIT NEW YORK PHILADELPHIA DALLAS ATLANTA

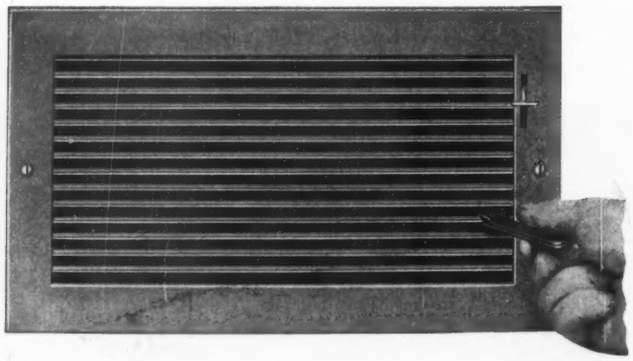
Beauty Strength Air Capacity

YOU GET THEM ALL IN AUER Fin-Flex Registers

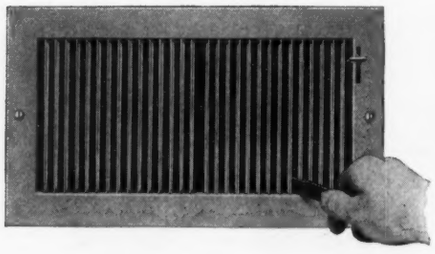
Almost any manufacturer can bring out a NEW register. But when Auer announces an air conditioning register like Fin-Flex, you can be sure that it has all the merit which only long experience can build into it—structural strength, beauty of line and finish, proper free air capacity. You can use Fin-Flex on any type of air conditioning job—it's appropriate architecturally and very moderate in cost.

Auer offers a complete line of registers and grilles for all gravity heating and air conditioning needs. Your supply house will gladly show you the fine points of Auer Quality Products.

Ask for your copy of latest Auer Air Conditioning Catalog showing many styles of registers and intakes.



Fin-Flex models come with either vertical or horizontal fins—all easily adjusted at time of installation for any desired effects.



THE AUER REGISTER CO., 3608 PAYNE AVE., CLEVELAND, O.

AUER DISTINCTIVE **REGISTERS**

& GRILLES For Air Conditioning *and* Gravity

109 MONCRIEF FURNACES

AND WINTER AIR CONDITIONERS

● A wide range of types and sizes gives you just the unit you need for any and every installation. The Moncrief line is complete, including Cast and Steel Furnaces, Winter Air Conditioners, gas, coal or oil fired, and Pipe, Fittings and Accessories for both gravity and air conditioning installations.

Whatever your requirement, Moncrief can supply it.
Write for catalogs and prices.

THE HENRY FURNACE & FOUNDRY CO.
3473 EAST 49TH STREET • CLEVELAND, OHIO

MONCRIEF maintains a highly competent Engineering Department to assist dealers in estimating and laying out plans.

Provides an extensive line of literature to promote sales.

Gives your customers the benefits of the most liberal financing plan available anywhere.

The most widely used Filter for Central System Air Conditioning Service!

COMPACT DESIGN

HIGH CLEANING EFFICIENCY

CONVENIENT INEXPENSIVE MAINTENANCE

A TYPICAL AIRMAT PL-24 INSTALLATION

THE three outstanding features of the Airmat PL-24 Filter—Compact Design, High Cleaning Efficiency, and Convenient Inexpensive Maintenance—have made it the outstanding choice of ventilating and air conditioning engineers. It requires no more space than an ordinary viscous filter but because of its unique loading principle provides 30 square feet of filter surface area. The filter media is the patented Airmat paper furnished in 225 ft. rolls which may be applied with either a mechanical or manual loader.

Airmat PL-24 Filters are ideal for all types and sizes of central air conditioning systems where highest efficiency and easy maintenance count. Write for Bulletin No. 230A.

AMERICAN AIR FILTER COMPANY, INC.

Incorporated

102 Central Ave., Louisville, Ky.

In Canada: Darling Bros., Ltd., Montreal, P. Q.

AMERICAN AIR FILTERS

No Extra Cost — For This Added Protection Against Motor Breakdowns in Damp Basements

Typical Domestic Air Conditioning Installation, Equipped with Century Capacitor Type Motor

New Century Insulation Has Much Higher Resistance to Damage Caused by Moisture

Motors located in damp basements are subject to trouble caused by moisture soaking into the insulation and paving the way for breakdowns. . . . This results in complaints . . . dissatisfied customers . . . expensive service calls . . . lost time.

Now—it is easy to turn these losses into profits . . . make satisfied customers and friends for your product . . . *at no extra cost.*

Before you make any commitments be sure to investigate this new Century Insulation Treatment. . . . It resists deterioration and absorption of moisture. . . . It solidifies the coils into a flexible impervious mass. . . . It seals as it penetrates. . . . Prevents "chafing" between wires. . . . Resists mechanical abrasion. . . . Is thin enough to radiate heat.

Phone, Wire or *Write* to any of Century's 31 conveniently located branch offices where you will find a qualified representative eager to help you save money.

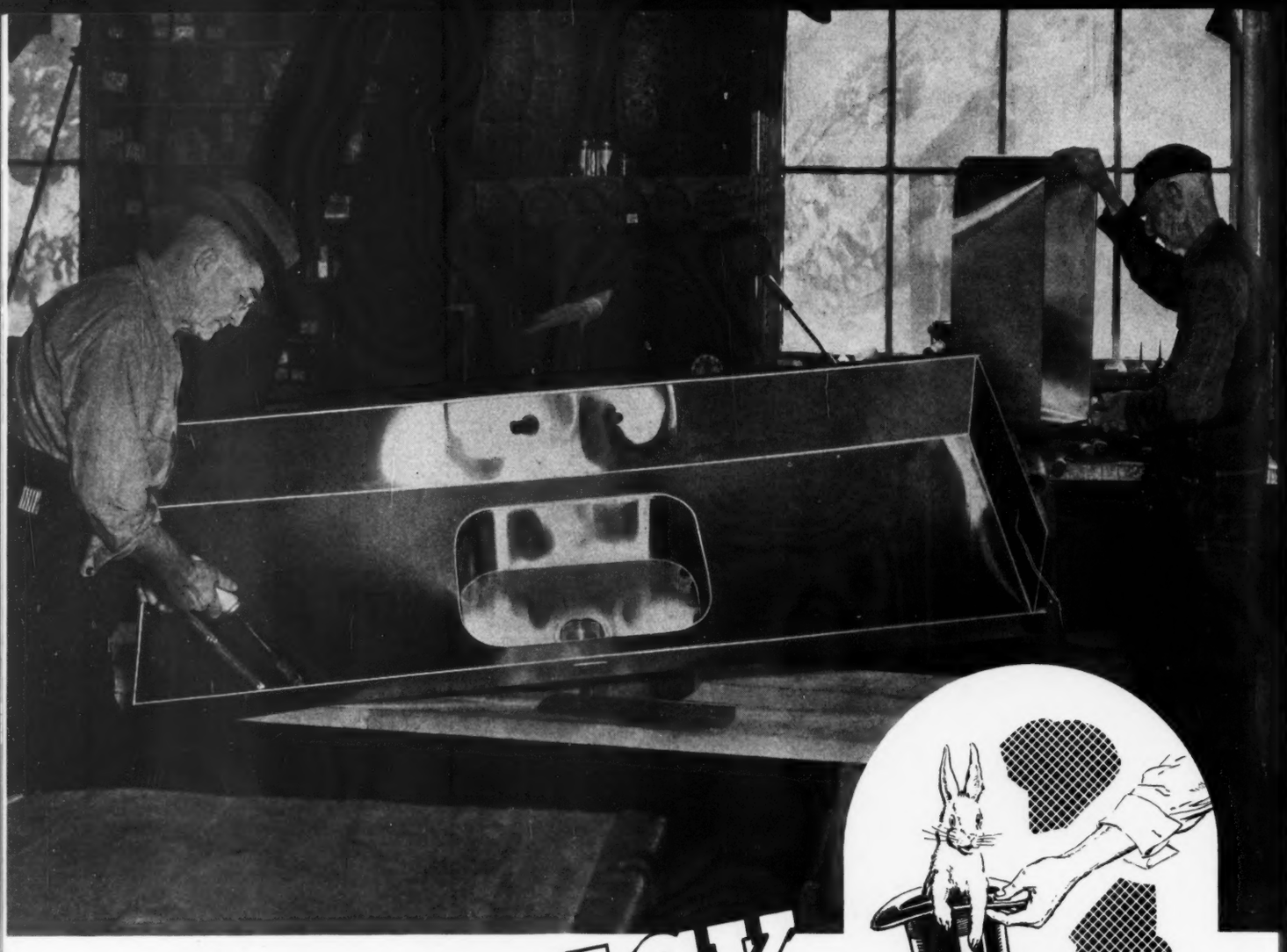
Century MOTORS

CENTURY ELECTRIC COMPANY

1806 Pine Street • • • St. Louis, Mo.

Offices and Stock Points in Principal Cities

ONE OF THE LARGEST EXCLUSIVE MOTOR MANUFACTURERS IN THE WORLD



ONE TRICK

in working stainless steel is to use

REPUBLIC STEEL
REG. U.S. PAT. OFF.
ENDURO
REG. U. S. PAT. OFF.
REPUBLIC'S PERFECTED STAINLESS AND HEAT-RESISTING STEELS

• One of the tricks in working stainless steel is to select a material upon which you can depend at all times for uniformity — in analysis, size, gauge, finish and fabricating quality. Such a material is ENDURO, Republic's Perfected Stainless Steel.

Small shops as well as large shops are using ENDURO — fabricating it into sinks, signs, tables, building trim and other items without difficulty. And they are realizing worth-while profit.

Let us tell you more about this perfected stainless steel. Let us tell you, too, about the little tricks in fabrication that will help you to work ENDURO easily and profitably. Republic Steel Corporation, Alloy Steel Division, Massillon, Ohio—General Offices, Cleveland, Ohio.

REPUBLIC STEEL

UNION DRAWN STEEL DIVISION · TRUSCON STEEL COMPANY
BERGER MANUFACTURING DIVISION · STEEL AND TUBES, INC.
NILES STEEL PRODUCTS DIVISION

AMERICAN ARTISAN

Volume 107 Number 10

Some Code Problems

TO those contractors and contractor organizations now promoting a local ordinance to regulate the design and installation of warm air heating and air conditioning systems—this warning. Provision should be made for flexibility in decisions. If such flexibility is not provided for, endless and useless bickering is bound to occur.

For example, the Minneapolis ordinance, which is the most complete code and has been copied in whole or in part by the greatest number of other communities, states that air velocities from high-side wall registers shall not exceed 600 feet per minute in a high velocity system (usually applied to industrial or commercial installations) and shall not exceed 550 feet per minute for the medium velocity system recommended for residential work.

The intention of this clause is probably all right, but any heating contractor with extensive experience knows that conditions do occur when it is necessary to project air from a high-side wall register at sufficient velocity to carry 30, or 40, or more feet to the opposite wall. And data from the Research Residence shows that to carry 30 feet and get a mixture, an initial velocity of 600 feet per minute is probably a minimum; a mixture at 40 feet requires not less than 750 fpm initial velocity.

Several codes we have on file, contain a minimum pipe size for stacks and branches and these minimum sizes are generous. We feel that small pipes and high velocities offer a definite solution to the air distribution and cost problems of certain types of houses and several American Artisan test houses used nothing larger than a 6-inch pipe.

In our judgment, the heating inspector should not be responsible for final decision in problems of this kind. The inspector is hired to see that the regulations of his ordinance are lived up to and that contractors do not violate these specifically stated regulations. No inspector should be expected to go beyond the written regulations and decide that a certain idea is acceptable or another idea is not acceptable. Should he follow such a practice he sets himself up as above the ordinance and becomes, in actuality, an ordinance unto himself.

But there should be provision made for a decision by a board of contractors or engineers who should decide upon obtainable data whether ideas outside the regulations of the ordinance are acceptable. Such procedure should be provided for in the ordinance in order that amendments to the sections need not be made every time a special problem is decided.

With residential practice still changing rapidly and with new apparatus and research data constantly altering heretofore accepted methods, city ordinances should not be hindrances to progress.

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Ready for Winter

The Federal Housing Administration's campaign —"Ready for Winter" should receive the wholehearted support of every contractor in this industry. FHA, for its part, proposes to devote all its far flung facilities to focusing public attention on the need for "putting the American home in condition" for the coming winter season. In many communities committees representing the entire building industry are actively behind this movement—believing that in the campaign lies a great opportunity to close contracts which have been hanging fire or which might go over to next year unless some special inducement is offered.

With the added impetus which should spring from this nation-wide program, 1938 seems likely to exceed 1937 in dollar volume of work completed in heating, sheet metal and roofing. 1938 did not start off very auspiciously. All during the winter and spring business volume for our industry lagged behind 1937, excepting in a few localities. But about July a change occurred. Contractors began to report more work, more contracts closed, larger dollar sales, greater variety of work under way. At the same time FHA reported that mortgages accepted for insurance up to the end of July were 20 per cent over the same period for 1937. Modernization loans for July struck a new high.

Also encouraging was the report that savings and loan associations were providing more money for construction and remodeling for June and July than for previous months in 1938. This would indicate that private funds began to filter into the market during the middle of the summer—a fact which should be encouraging.

That new homes are needed and that much remodeling still remains undone, no one denies. But with money available and with all members of this and other industries pushing the owner to "buy now," 1938 ought to be a profiable year.

In the September issue, page 67, in the article entitled—"Oil-Fired, Two-Speed Blower System" we gave the name of the furnace used as "Perfex." This is incorrect—the furnace used is "Superfex" manufactured by the Perfection Stove Co., Cleveland. We call attention to this error in order that contractors interested in this type of system may know the correct furnace used.

Light Weight Copper Roofs

THE sheet metal and warm air heating firm of Reinick and Krueger, Madison, Wisconsin, has been more than ordinarily active this past summer in two classes of work which illustrate the changes in typical shop operations. The first activity is the introduction to Madison home owners of light weight copper roofs laid in strips rather than shingles or sheets; the second activity is the installation of winter air conditioning employing the latest comfort and health making devices.

The light weight copper roofs introduced by the firm employ an idea in copper application known as "Double-Lock" and developed by Copper Roofs Corporation, Milwaukee. The material is laid in strips running horizontally across the roof. The strip is specially cold rolled and annealed copper backed with insulating felt on the underside. The material is 3 oz. in weight, 12 inches wide; the felt backing is 6 pounds in weight, 9⅜ inches wide, leaving bare edges for the locks.

To apply the roof the sheathing boards are covered with 15-pound asphalt saturated felt laid with a 2-inch lap or the copper may be laid over old shingles. Each copper strip is double locked to the strips above and below with the crimp ⅜ inch wide. Copper cleats are folded into the crimps at 6¾-inch intervals. These cleats are ½ by 1½ inches in dimensions and are fastened with 3d., 14 ga., copper nails.

Laying begins at the eave with a "starter strip" which is held in place by a lath or half round and placed with the felt side out as shown in Fig. 1. This forms a positive drip into the gutter. The curves obtained allow free expansion and contraction and produce a tile appearance.

This tile-like appearance is obtained by nailing

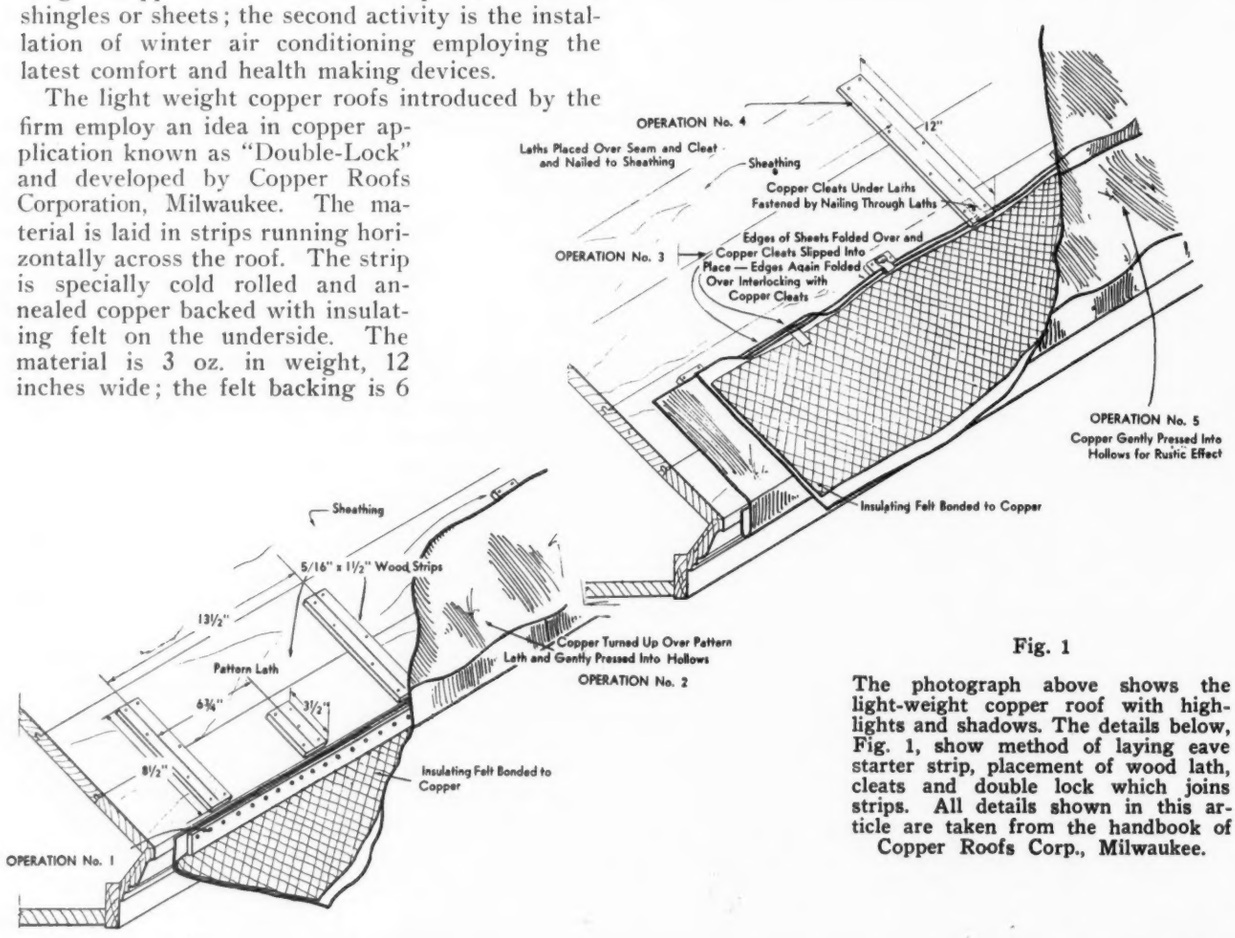
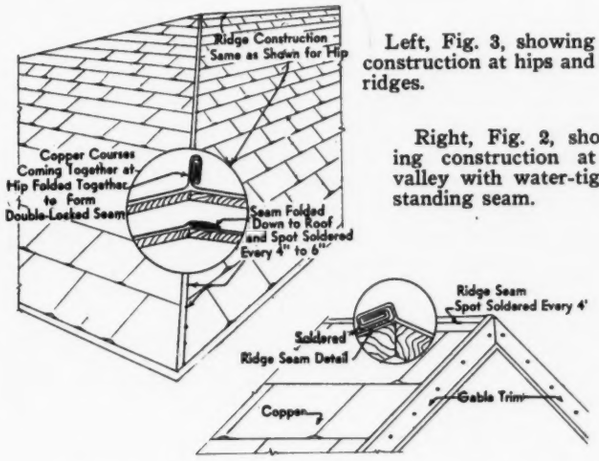

OPERATION No. 4
Laths Placed Over Seam and Cleat and Nailed to Sheathing
Sheathing
12"
Copper Cleats Under Laths Fastened by Nailing Through Laths
OPERATION No. 3
Edges of Sheets Folded Over and Copper Cleats Slipped Into Place — Edges Again Folded Over Interlocking with Copper Cleats
OPERATION No. 5
Copper Gently Pressed Into Hollows for Rustic Effect
Insulating Felt Bonded to Copper
Sheathing
5/16" x 1½" Wood Strips
13½"
Pattern Lath
6¾"
3½"
8½"
Copper Turned Up Over Pattern Lath and Gently Pressed Into Hollows
OPERATION No. 2
Insulating Felt Bonded to Copper
OPERATION No. 1

Fig. 1

The photograph above shows the light-weight copper roof with highlights and shadows. The details below, Fig. 1, show method of laying eave starter strip, placement of wood lath, cleats and double lock which joins strips. All details shown in this article are taken from the handbook of Copper Roofs Corp., Milwaukee.

lath under the copper as shown in Fig. 1. On the first course the lath alternates 8½ inches and 3½ inches long, 6¾ inches apart, as shown. From the second course to the ridge all laths are 12 inches long, but the bottom of one lath is 3½ inches below the top of the lath adjoining. See Fig. 1.

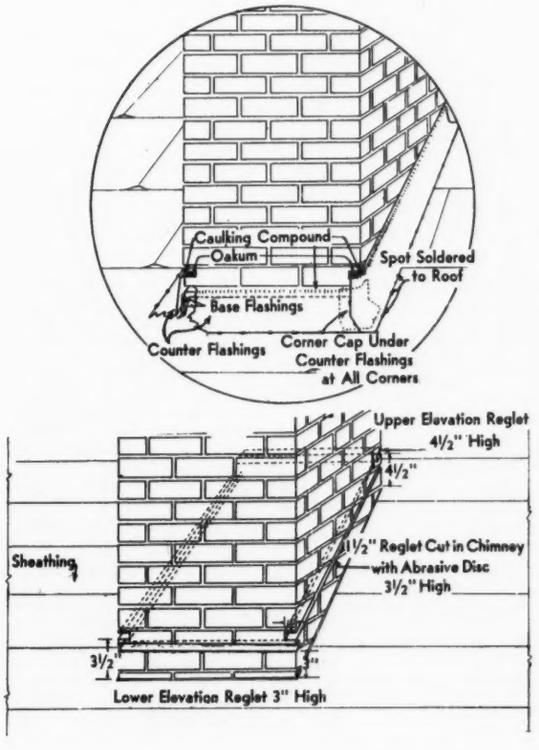
With the first row of lath in place the "starter strip" is turned back over the roof and gently pushed down between laths. The upper edge is then double locked with the lower edge of the second strip and the second strip then pushed down between the laths.

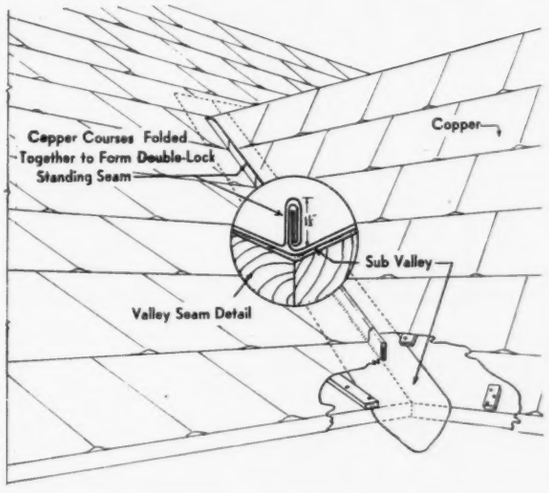

Ridge Construction Same as Shown for Hip
Copper Courses Coming Together at Hip Folded Together to Form Double-Locked Seam
Seam Folded Down to Roof and Spot Soldered Every 4" to 6"
Ridge Seam Spot Soldered Every 4'
Soldered Ridge Seam Detail
Gable Trim
Copper

Left, Fig. 3, showing construction at hips and ridges.

Right, Fig. 2, showing construction at a valley with water-tight, standing seam.

An interesting feature is the fact that the laths are not first nailed down all over the roof. Instead, the copper cleats are folded into the crimp, spaced 6¾ inches apart. The laths are placed over alternate cleats and a copper nail is driven through the lath so that it pierces the cleat beneath. Cleats between these laths are nailed to the tops of the laths projecting beyond the previous copper strip.





At no place, therefore, do these holding nails pierce the copper strips and no nails are exposed to the surface. The laths are nailed to the sheathing boards with a cement coated wire nail. (See Fig. 1.)

Valleys are reinforced with an underlying 12-inch copper strip. The copper courses coming together at the valley are double folded together to form a standing seam 1 inch in height. (Fig. 2.) Copper strips coming together at hips and ridges are double folded together, folded the third time to the roof surface and spot soldered at 5 or 6-inch intervals. (Fig. 3.) Sheets at the gable edge are trimmed, nailed down and covered with 12-oz. copper trim which is nailed to the gable edge and spot soldered to the roof (Fig. 3.) These are the only soldering operations; the roof strips are not soldered.

Special flashing procedure for chimneys or rising walls has been worked out, employing a motor driven carborundum disc which cuts a reglet in the brick wall parallel to the slope of the roof. The upper edge of the flashing is caulked into the reglet, turned down the face of the brick work, turned out over the roof and spot soldered to the roof sheets. (Fig. 4.)

Two recently completed roofs by Reinick and

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Left, Fig. 4, showing reglet cut parallel with roof slope with special disc and method of joining roof to flashing. Below—typical furnace and duct work by Reinick and Krueger.

Krueger are shown in the photographs. One roof is steeply pitched; the other is just over the minimum pitch recommendation; both show the pleasing effects obtainable.

The residence with the low-pitched roof is heated by a Sunbeam gas fired, winter air conditioner installed by Reinick and Krueger. As the floor plans show, there is no basement; the furnace room being on the same level as the garage, side entrance, study, bed room with bath. On the floor above is the front entrance, living room, kitchen, two bed rooms and a bath. The space allotted to the heating equipment is so small that the two photographs had to be taken looking through the door and a window. Excepting in the equipment room and garage, where all piping is exposed, the runs of pipe off the plenum are concealed behind furred ceilings. These runs of branch and main pipes are numbered on the heat loss sheet shown; also pipe, register, return sizes.

In this house all warm air registers are placed in the side walls level with the tops of doors and windows. Returns are placed in the base board. One of the photographs shows a typical pair. To get the air to these registers wall stacks run up to ground and first floor registers through partitions as shown in the plans. Piping was so arranged that two warm air mains and three return air mains handle all the rooms.

The data sheet shown is based upon the design adopted for the Sunbeam manual. Factors used are selected from pre-calculated tables for different outside temperatures; "exposures" shown are running feet of crack, square feet of surface, etc. Multiplying the exposure by the factor gives the cfm directly. To this is added a percentage for duct heat loss to get required cfm. In this house, because all pipe is within rooms served, no duct heat loss was calculated.

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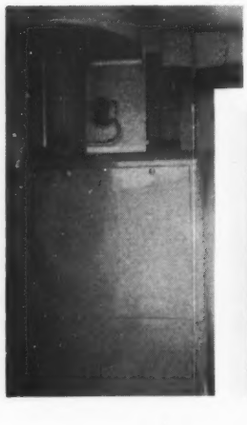
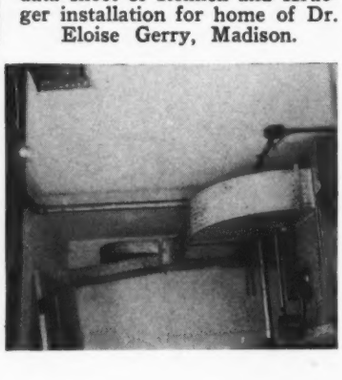
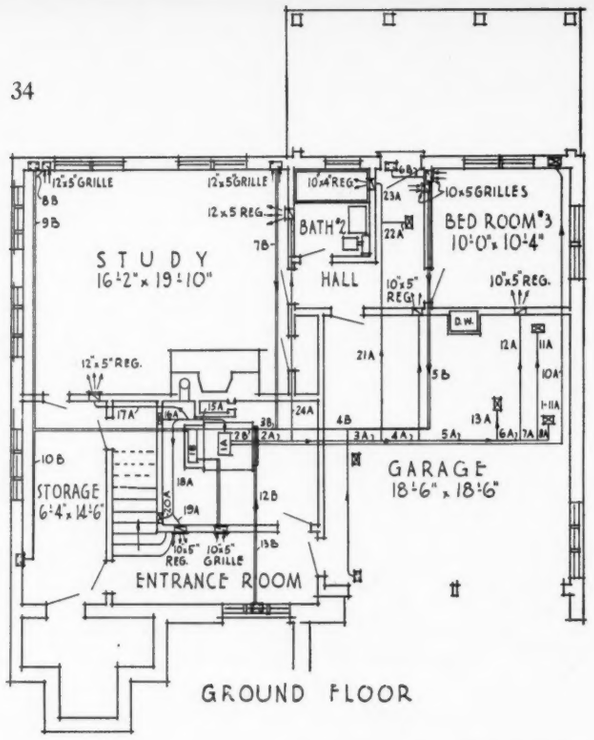
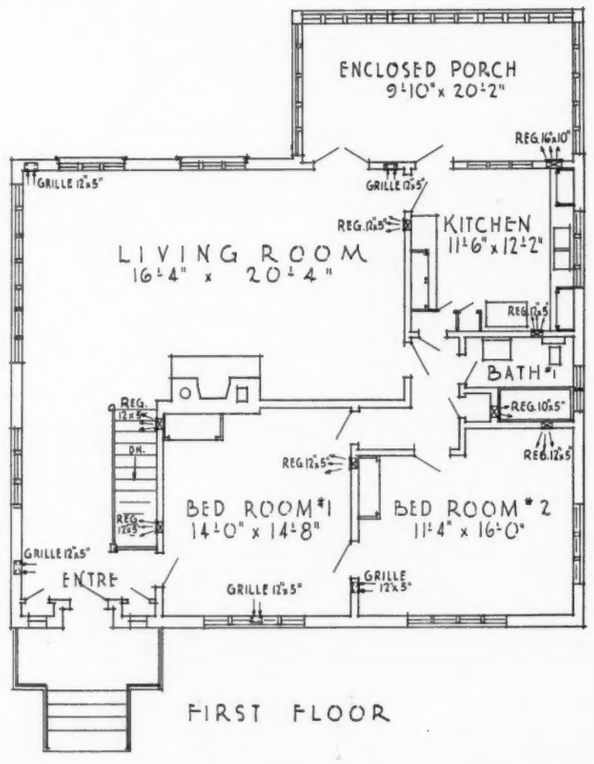




Above, low pitched, light-weight copper roof; below, furnace and duct work; right, floor plans and data sheet of Reinick and Krueger installation for home of Dr. Eloise Gerry, Madison.





Name Dr. Eloise Gerry Street Shorewood Hills City Madison, Wisconsin

Heating Contractor Reinick & Krueger Date May 10, 1938 Job No.

Unit No. D-R Units Capacity at Register 107,100 Fuel Gas

ROOMS	Garage	Bed Rm. #3	Bath #2	Rear Hall	Study	Entrance	Bed Rm #1	Bed Rm #2	Bath #1	Kitchen	Porch	Living Room
INFILTRATION	90 .861 .77	65 .86	52 .86	16 .87	20 .18	64 .87	48 .43	60 .86	40 .83	22 .78	44 .39	242 .192
TOTAL EXPOSED WALL	204	168	48	50	286	264	116	230	50	190	284	244
GLASS	57 .86 .77	137 .44	40 .84	10 .8	21 .12	70 .89	100 .86	40 .83	70 .39	10 .8	64 .38	110 .84
NET WALL	147 .04 .08 .13	177 .11	128 .13	30 .8	9 .8	260 .84	204 .86	76 .7	160 .16	40 .6	156 .13	146 .17
FLOOR	64 .18 .86	280 .45	110 .21	48 .18	90 .18	280 .69	96 .17	X	X	X	X	242 .87
CEILING	72 .04 .77 .18	X X	X X	X X	X X	X X	X X	X	X	X	X	X
SUB-TOTAL C. F. M.	137	85	48	80	185	145	108	187	57	102	309	192
DUCT LOSS—See page 2	%	%	%	%	%	%	%	%	%	%	%	%
TOTAL C. F. M.						Up Down						
HEAT PIPE REQUIRED		2x8	2x8	2x8	2-4x8	4x8 4x8	4x8	4x8	2x8	4x8	12x8 to 14x10	2-4x8
RISER REQUIRED		8½x10	8½x10	8½x10	2-8½x12	12 10 8½x12 12 10	8½x12	8½x12	8½x10	8½x12	16x8	2-8½x1
REGISTER REQUIRED		10x5	10x4	10x4	2-12x5	8 8	12x5	12x8	10x5	12x5	16x10	2-12x8
RETURN AIR DUCT REQUIRED		8½x10		8½x10	2-8½x12	12 10 8½x12 12 10	8½x12	8½x12		8½x12		2-8½x1
RETURN AIR RISER		8½x10		8½x10	2-8½x12	12 10 8½x12 12 10	8½x12	8½x12		8½x12		2-8½x1
RETURN AIR INTAKE		10x8		10x8	2-12x8	8 8	12x8	12x8		12x8		2-12x8
SUB-TOTAL C. F. M.								1868 .80 (BTU)			101,200	BTU
Add for Outside Air (where needed)							329	C. F. M. x 80 BTU			26,320	BTU
Wall Construction								Windows				Total BTU
Roof and Ceiling Construction	Calculation at 20° below							Floors				

A Survey of

TIME PAYMENT PLANS

WHEN FHA remodeling insurance ceased May 1, 1937, demands for time financing by home owners lead to an increased contractor interest in the time payment plans of manufacturers of equipment and available finance companies. In an effort to compile recent information a questionnaire was mailed to manufacturers of air conditioning equipment.

Of the replies received, a number declared such information is confidential and publication is not solicited. A goodly number of manufacturers, however, supplied information complete enough to make up the tabulation shown. This tabulation in general requires no additional information. There were, however, several comments interesting enough to elaborate upon.

Typical Finance Company Procedure

The plan of one manufacturer using a finance company is so typical of this procedure that we quote: "When a dealer has been authorized to sell equipment under the C. I. T. time playment plan, he is contacted by a representative of the C. I. T. Corporation who explains this plan to him and furnishes him with the necessary forms and finance charts to be used. Before the dealer makes a sale under the finance plan, he must contact the local office of the C. I. T. Corporation for credit approval of his customer. When the credit has been approved, he draws up a conditional sale contract or a chattle mortgage, which ever is used in the state in which the sale is made, and proceeds with the installation. The customer is required to make a down payment of ten per cent of the contract price or a minimum of $25. When the installation is completed, the dealer requests the customer to sign an installation certificate showing that the installation is made. He then presents the conditional sale or chattel mortgage contract with the installation certificate to the local office of the C. I. T. Corporation. The C. I. T. Corporation will then draw a check for the unpaid balance, less the finance charge, issuing it to the dealer and the manufacturer jointly. This check is then forwarded to the manufacturer, who in turn credits it to the account of the dealer, and issues a check to the dealer for the difference between the amount received and the amount of their invoice covering the equipment which the dealer installed. The dealer discounts this paper on a 100 per cent basis. The equipment can be financed over a period of three years."

Another manufacturer has worked out a plan with the local bank. Retail dealers or contractors may deal directly with the bank or through the manufacturer. Ten per cent of the selling price is deposited with the bank as an insurance fund. When the contract has paid out, this 10 per cent is returned to the dealer. Some dealers, they say, prefer to indorse with recourse. In such cases the full amount is paid out. The cost of this financing is six per cent on amounts up to $200, five per cent from $200 to $2,000. The maximum time is thirty-six months, but shorter terms are advocated. Twenty-four months' period is the popular term, but the average contract is eighteen months.

This manufacturer uses a property improvement contract on non-removable items. This contract gives option on mechanics' lien. On removable items, a conditional sales contract is used. Purchasers are requested to sign a credit statement and finally an installation certificate. This system, they say, is working very satisfactorily.

Summer Plans

Several of the concerns reporting mention summer plans, whereby the heating equipment is installed anytime between April and September with payments to start in September or October. These plans vary slightly, but for the most part there is no extra cost to the home owner—the manufacturer and dealer each benefitting by keeping their employees busy in what would otherwise be a slack season and avoiding to some extent seasonal rush in the fall. Some use an entirely different contract form, but one large concern simply asks the dealer to change the wording of the note "beginning one month after date hereof" by drawing a line through the word "one" and writing above it the number of months the first installment is to be deferred—the purchaser to initial this change.

One manufacturer offers a low rate and payment to the dealer during the slack months when he can make installations much cheaper than during the rush period. Their plan also permits the dealer to get his quantity discount and cash discount by the use of the contracts. It gives him an opportunity to finance his business, especially volume business, which he could not do otherwise.

The summer plan of one concern states that one-half of one per cent additional is to be charged for each month in which no payment is made. In this particular case, however, the discount basis is six per cent for twelve months, seven-and-a-half for

Report No.	Contracts Financed by: Equipt Mfr'er.	Contracts Financed by: Finance Co.	Name Finance Company	Cost of Financing to: Home Owner	Cost of Financing to: Heating Contractor	Advantages Suggested and General Remarks
1	Yes	—	—	6%	—	
2	—	Yes	C I T	6%	—	Believe plan permits ample protection as well as giving term financing adequate to meet constructive requirements
3	—	Yes	F B C	7%	—	Non-recourse to dealers
4	No plan at present		—	—	—	Making arrangement for finance plan
5	No plan at present		—	—	—	Dealers select own finance company, mostly C I T
6	Yes	—		?		Finance own furnace sales. Conditioner sales made bill attached to B/L or net cash or approved credit
7	—	Yes	F B C	7%	—	No recourse to dealers. No holdback
8	No plan at present		—	—	—	
9	—	—	Finance thru dealer's local bank	$ to $200—6% $200 to $2,000 5%		10% of selling price of removable items is deposited with bank as insurance fund and returned to dealer when contract has paid out. If dealer prefers to indorse with recourse, the full amount is paid out. Maximum time 36 mos. 24 mos. popular, but average is 18 mos. Shorter terms advocated. 20% down payment on non-removable items. Installation in spring with first payment Oct. 1. Property Improvement Contract is used on non-removable items (furnaces, etc.)
10	Yes	—	—	6%	$1.75 Credit investigation fee	Applies only on 24-mo. contract
	Yes	—	—	6%	1%	Secondary plan: 36 mos. 10% down payment, no recourse to dealer after 4th payment. Summer Finance Plan, 1st payment Sept. 1
11	Yes	—		6%		1st Payment, or full payment Sept. 1 without any finance charge to the dealer or his customer between April 1 and Sept. 1. Dealer also gets quantity and cash discount by the use of the contracts
12	No plan at present		—	—	—	
13	Yes	—	—	7%	—	Spring and Summer finance plan with first payment Sept. 30. No down payment and no extra charge for deferred payment
14	—	Yes	S F C	6%	$1.00	Plan aids dealer by being simpler than F H A
15	—	Yes	F F C	6%	—	(1) Retains 10% until contract is paid out. 10% downpayment on 12 mos. or less contracts. 15% down payment on 12 to 18 mos. contracts
16	—	Yes	C I T	6%	—	High pressure salesmanship is our main problem. Do everything possible to discourage purchasers from over-committing themselves. Like to restrict conditional sales contracts to 12 mos.
17	Yes	—	C I T if paper is rediscounted	7½%	—	Pass own credits. Forms supply full protection to contractor. File contracts with Recorder of Deeds at own expense. No recourse
18	Yes	—	—	6 %—12 mo. 7½%—18 mo. 10 %—24 mo. 12½%—30 mo. 15 %—36 mo.		No recourse on dealer after 4 installments are paid. Summer plan costs ½ to 1% additional for each month in which no payment is made
19	Yes	—	—	?	—	Handles a few time payment contracts through their own banking connections. 18 mos. limit—prefer 12 mos. Will not use a finance company which charges a fee in addition to interest
20	Yes	—	—	Confidential	—	Capital is sufficient to carry own deferred contracts
21	—	Yes	C I T	6%	—	Limited recourse plan
22	Yes	—	—	Confidential	—	No cost to dealer. No recourse. Capital sufficient to handle own paper
23	—	Yes	F B C	7%	—	Low interest summer plan. No recourse. No holdback. Summer plan—payments begin in October
24	—	Yes	C I T	6%	—	10% down payment or minimum of $25. Dealer discounts paper on 100% basis for domestic installations; 90% basis for commercial installations, retaining 10% as a reserve until 1st four payments are made promptly on schedule and then refunded. If 1st four payments are not paid promptly by the customer, the 10% is retained until the contract is completely paid
25	Yes	—	—	7%	—	Manufacturer assumes 2% liability on all contracts. No losses after three years. No recourse. Dealer must complete satisfactory installation before he can receive his money. No holdback. No down payment until installation is completed. Summer deferred payment without additional cost

eighteen, ten for twenty-four; twelve-and-a-half for thirty and fifteen per cent for thirty-six months.

Another manufacturer's summer plan reads "Under this plan the order is taken in the same manner as the regular plan, but the finance charge is based on the deferred time, plus the number of monthly payments to be made. For example, if the dealer obtains an order on June 15 and the customer desires to defer payments until October 15 and he further desires to pay the unpaid balance in twenty-four monthly payments, the number of deferred months are added to the number of monthly payments desired. In this case the rate would be on twenty-eight months.

Down Payments

One manufacturer's plan calls for a twenty per cent down payment on non-removable items such as furnaces and only ten per cent on removable items such as blowers, oil burners, stokers, etc.

A second concern requires a ten per cent down payment on a thirty-six months contract.

A third requires a down payment of at least ten per cent, which the dealer is supposed to hold, the manufacturer purchasing the balance of the contract.

A fourth believes that heating contracts should not be taken on less than twenty per cent down payment and the time extended should not exceed two years.

A fifth concern requires no down payment, believing that the dealer will be able to interest more prospects. They suggest, though, if the purchaser wants to make a down payment, it should be accepted. A sixth does not insist on a down payment, but says it is a good practice to obtain as large a down payment as possible. A seventh, an affiliated finance company, requires a ten per cent down payment on contracts up to twelve months and a fifteen per cent down payment on contracts running twelve to eighteen months.

An eighth says down payment is optional. They urge, however, that a definite effort be made to obtain a $25 down payment. A ninth permits the dealer to defer the down payment until the installation is completed, but warns the dealer that because of the expenditures he must make before the job can be started, they sincerely recommend that as large a down payment as possible be obtained with the order in order to lighten the dealer's burden.

Contract Forms Used

The C. I. T. Corporation supplies an Industrial "Conditional Sales Contract" form applicable in the States of Arkansas, California, Illinois, Nevada, Oregon, Rhode Island, Tennessee and Utah. Similar forms and filing instructions are furnished for use in each state, subject to State legal requirements. This form is in triplicate with a copy each for the C. I. T., the purchaser and the seller.

The First Bancredit Company supplies their clients with a "Purchase Contract (with option)," a "Conditional Sale Contract," and "Purchaser's credit statement. An "Installation Certificate" is attached to the credit statement blank in one case, and detached in another. The "Purchase Contract" and the Conditional Sales Contract" are each in triplicate, the original to be sent to the First Bancredit Corporation, the duplicate to be given to the purchaser and the triplicate to be retained by the dealer. Another form supplied by this company is a "Chattel Mortgage" in triplicate, with a blank note attached. A rate chart accompanies these blanks.

Forms used by the concern who has devised a plan in connection with their local bank include "Purchase Credit Statement," a "Property Improvement Contract" in triplicate, a "Conditional Sales Contract," an "Installation Certificate" and a rate schedule.

A "Purchase Agreement" form is used by another concern. This form shows the cash price, down payment, unpaid balance, carrying charge, total due in payments, and the number and amount of the monthly payments. This form also in triplicate—one original to be held by the manufacturer, the duplicate by the dealer and the triplicate copy to be retained by the purchaser.

One large concern which handles time payments through an affiliated finance company, supplies a special promissory note form and a judgment note form. The judgment note form is used in Colorado, Delaware, Illinois, Maryland, Ohio, Pennsylvania and Wisconsin, and the promissory note form in all other states. The top half of this blank is a credit statement, followed by the note proper and finally an installation statement. Perforations divide these sections of the blank. A printed booklet describes the plan and gives directions and a rate chart.

Forms used by another manufacturer include a "Conditional Sale Agreement" in quadruplicate, with note attached to the original intended for the company, a copy for filing, a copy for the dealer and one for the purchaser. (This form is used in all states except Colorado, Indiana, Louisiana, Missouri and Ohio; a "Purchaser's Statement" for the purpose of securing credit, and a completion certificate.

Another concern uses a "Contract and Specifications" form, and an "Installment Purchase Note," both in triplicate. The original of the "Contract and Specifications" form has an assignment and credit statement on the back.

Certain states require affidavits by vendee and/or vendor and are used when such legal requirements demand.

Cost to the Dealer

Only two manufacturers charge the dealer with the credit investigation fee, from $1.00 to $1.75. Otherwise, there is no finance cost to the heating contractor.

Cost to the Home Owner

Interest rates to the home owner vary from 5 to 7½ per cent. Nine manufacturers reporting make an interest charge of 6 per cent on the unpaid bal-

ance to the home owner, five have a 7 per cent interest charge, one makes the rate 7½ per cent, while seven do not state. One manufacturer gives his cost of financing as 6 per cent on amounts up to $200, and 5 per cent from $200 to $2,000. Another quotes the cost as 6 per cent plus one per cent extra for the non-recourse feature. Still another has a sliding scale—12 months 6 per cent; 18 months 7½ per cent; 24 months 10 per cent; 30 months 12½ per cent; 36 months 15 per cent—with a half of 1 per cent additional for each month of the summer plan when no payment is made.

Without Recourse to Dealer

Only one of the plans outlined requires that the dealer indorse with resource; twelve are handled on a non-recourse basis, one offers dealers a limited recourse plan for time sales to consumers, the others make no mention of this particular feature.

One manufacturer believes that dealers accept their plan particularly because of the non-recourse basis; another says their time payment paper is handled by the First Bancredit Corporation without recourse to dealer and without hold back; another reports that 10 per cent of the selling price is deposited with the bank as an insurance fund, to be returned to the dealer when the contract has paid out (some dealers prefer to indorse with recourse and in such cases the full amount is paid out); another reports no recourse to the dealer and no reserve withheld; another withholds 10 per cent to be paid to the dealer as soon as the contract is paid in full; another takes all credit risk without recourse to the dealer and there is no holdback—100 per cent cash being advanced to the dealer the minute the job is completed and the note purchased.

One report says the manufacturer takes all risk and asks the dealer to assign the contract without recourse; another retains a 10 per cent reserve from the balance-to-be-financed until the contract is paid out (this reserve, they say, operates as a protection to both the dealer and the finance company in the events of defaults on contracts so that the dealer can accumulate a reserve to take care of balances defaulting in the event such occur. One plan reads "No recourse on dealer after four installments have been paid, provided he agrees to remove the equipment when required and will re-purchase such removed equipment at not more than 15 per cent of the face value of the note.

Time

The maximum time seems to be thirty-six months, with twenty-four months the popular period. One manufacturer believes eighteen months is the average period. An affiliated finance company states that the longer terms eliminate sales resistance created by large monthly payments.

The following, however, may indicate a trend toward shorter installment terms:

"The movement toward a strengthening of installment credit terms which has been manifested during recent months in the automobile trade is now making itself felt in the appliance field," said John R. Walker, executive vice-president of the National Association of Sales Finance Companies late in August, 1937.

"Terms on mechanical refrigerators, ranges, and water heaters are being shortened from a maximum of thirty-six months heretofore prevailing to a maximum of thirty months.

"Terms on dishwashers, ironing machines, space heaters, and washing machines are being shortened from a maximum of thirty-six months to a maximum of twenty-four months; while terms on vacuum cleaners and household radio sets are being shortened from a maximum of twenty-four months to a maximum of eighteen months.

"The greatest shortening of terms applies to contracts covering combination purchases which heretofore had been permitted to extend to a maximum of forty-eight months, but which henceforth will be limited to the maximum term applicable to any item in the combination purchase.

"An important change is also being established with respect to the 'Down Payment.' Heretofore purchase contracts have been accepted without any down payment. Henceforth a minimum down payment of $5.00 or ten per cent of the cash price, whichever is the larger, will be required."

Credits and Collections

Most of the forms submitted include a credit statement blank. One manufacturer advises that all credit reports are checked prior to their being forwarded to the finance company for final acceptance or rejection. Another reports "We absolutely pass our own credits and do not depend on the fixed policies of credit existing with finance companies." Still another requires a credit statement, a credit report and property check, and a slip giving details of sale. The finance company is contacted for credit approval of the customer in another case. Another plan calls for definite investigation of credit before passing by the manufacturer. Still another asks a local credit bureau report, or offers to get one for the dealer.

Proceeds to Dealer

In most cases the proceeds are refunded to the dealer promptly upon completion of the installation. One manufacturer pays the dealer the unpaid balance less ten per cent as soon as the job is completed, even though payment is not to be made until September 1. The ten per cent is paid to the dealer as soon as the contract is paid in full. Another reports "No holdback—100 per cent cash advanced to dealer the minute the job is completed and note purchased." Still another says that upon receipt of the note properly dated, signed and endorsed, the dealer's account will be credited—the credit to be used first to pay any past due balance the dealer owes, to pay for any goods used on the particular job it covers, and the balance, if any, will be refunded to the dealer in cash. The finance company in one instance accepts the contract from persons

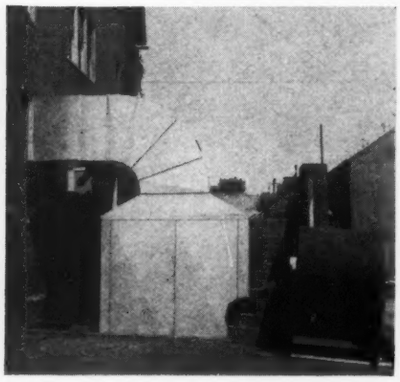
(*Continued on page* 94)

Mary Carlisle, Tinsmith [Figurines]

By A. B. Laing

FIRST movie star to take up tinsmithing (as a hobby) is Mary Carlisle, Bing Crosby's leading lady in "Doctor Rhythm." She bought herself some snips and other tools and now has quite a shop fixed up in a corner of her Hollywood home.

Mary has no ambition to fabricate metal on a commercial basis, in fact none of the glittering products of her Tin Studio are for sale. A few she gave away as gifts during the Christmas season, but for the most part, Mary prefers to keep her handiwork at home. Dolls and figurines in the most original of metal designs adorn the mantel and shelves of her boudoir. She claims that galvanized iron, monel metal, copper and tin are exquisite mediums for modelling and creative design and tinsmithing is 'tops' as a means of relaxation from the grind of movie-making. Mary boasts she hasn't cut her hand—not once—so far.



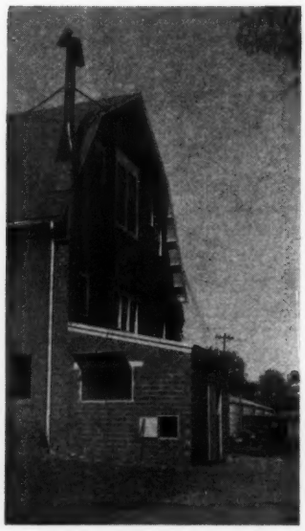


Fig. 9—Left—Furnace set and cased; stoker ready for setting. Fig. 10—Center—Ready to move blower into place. Fig. 11—Right—Finished furnace room.

Designing A Seed Corn Drier [Part 2]

By Alfred R. Wagstaff

Engineer, Sioux City Fdy. and Boiler Co., Sioux City, Iowa

THROUGH courtesy of Mr. R. C. Watland, manager of the seed corn department; Mr. Charles Plendl, who tested the corn during the drying season and Mr. Lew Bennett, manager of the driers, all of the Michael-Leonard Seed Company, many tests and records were made during part of the drying season.

As corn was received and during the drying it was tested with an oil and electric moisture tester in the testing department shown in Fig. 14. In using this tester, 100 grams of shelled corn was mixed with 150 c.c. of oil and placed in a flask having a thermometer through the cork. This was then placed over an electric heater and heated until the temperature reached 190°C at which time the heat was shut off and the flask allowed to cool. A condenser in a pan of water was high enough so that the condensate could drip into a graduate and was connected to the flask. When the temperature had cooled to 170°C the water in the graduate was read and this represented the percentage of moisture in the corn being tested. This test usually took about twenty minutes. The corn was tested when placed in the bins and at various times during the drying process to keep a check on each bin, also after shelling. These tests were noted on cards as shown in Fig. 15.

After the South drier had been in operation for a week a bin was selected and moisture tests were made and measurements taken during the drying. This was bin No. 22. When dried, this bin was shelled and weighed separately from the others so a complete check could be made, and the following results were obtained:

10/5	10:00 A. M. 26.4%	Av. corn height 6 ft. 1 in.
10/6	10:30 A. M. 18.9	
	2:30 P. M. 17.6	
	5:30 P. M. 15.4	Av. corn height 5 ft. 0 in.
10/7	6:10 A. M. 12.2	
	10:00 A. M. 11.5	Av. corn height 4 ft. 6 in.

Shelled weight 81 bu. 44 lbs or 81.786 bu.

As this bin had a floor area of 40.27 sq. ft., the
oringinal drying volume was $40.27 \times 6.083 = 244.96$ cu. ft.
And at the end of drying was $40.27 \times 4.5 = 181.22$ cu. ft.

Showing a shrinkage of ..... 63.74 cu. ft.

The actual shrinkage by volume during the drying was 63.74/244.96 or 26%.

At the start of the drying the corn occupied a space of 244.96/81.786 or 3 cubic feet,

and when dried the corn occupied 181.24/81.786 or 2.215 cu. ft. The moisture removed was as follows:

at 26.4% corn and cob weigh..... 83 lbs. per bu.
at 11.5% corn and cob weigh..... 65 lbs. per bu.

or a loss of..... 18 lbs. per bu.

for 81.786 bu. the moisture removed was 81.786 × 18 or 1472.15 lbs. in 48 hours or

1472.15/48 = 30.67 lbs. removed per hour, average.

This drying is shown graphically in Fig. 16. The lower curve is a bin which was started while bin 22 was drying and which dried in a shorter period of time. The top line of Fig. 16 is the relative humidity of the air obtained from the U. S. Weather Bureau, the next line the hourly temperatures, while the time of day or night is shown at the bottom of the figure together with the number of hours as the

Fig. 14—Corn testing department with Charles Plendl, tester, and apparatus used during tests.

drying progressed and the day of the month.

To get a more accurate check a separate test was made on two ears of corn. Two ears of corn having the same weight and from the same load were selected. One ear was weighed, shelled and the corn and cob weighed separately, after which each was tested for moisture content. A string was tied about the other ear and placed in a bin of the same moisture content corn which was drying. When the bin was dried, this particular ear of corn was again weighed, shelled, the corn and cob weighed separately and then tested separately for moisture content. The following results were obtained:

Moisture removed from corn and cob during a drying period of 24 hours:

Total weight Before drying	Wt. of corn	Moisture	Wt. of cob	Moisture
15.00 oz.	11.75 oz.	25.0%	3.25 oz.	26.0 %
After drying 13.33 oz.	10.46 oz.	14.0%	2.875 oz.	14.47%
Difference 1.67 oz.	1.29 oz.	11.0%	0.375 oz.	11.53%

Corn at 25% weighs 81.2 lbs. per bushel, or for this corn $81.2 \times 16/15$ = average of 86.6 ears per bu.

The corn and moisture weighed

$11.75 \times 86.6/16 = 63.6$ lbs.

The cob and moisture weighed

$3.25 \times 86.6/16 = 17.6$ lbs.

or per bushel..... 81.2 lbs.

The percentage of corn and cob is:

$11.75/15 = 78.3\%$ corn

$3.25/15 = 21.7\%$ cob

100.0%

The dried corn and cob was:

Corn ..... $10.46 \times 86.6/16 = 56.6$ lbs. to bu.

Cob ..... $2.875 \times 86.6/16 = 16.56$ lbs. to bu.

Total ..... 72.16 lbs. to bu.

Moisture removed per bu. $81.2 - 72.16 = 9.04$ lbs.

Using the volume of test on bin 22

$81.786 \times 9.04 = 739.35$ lbs. moisture removed

or

$739.35/24 = 30.8$ lbs. per hour which checks with the test on bin 22 of 30.67 lbs per hour.

This test shows the percentage of moisture taken

Bin 8

LOT 7034 Load 4

TIME	TEST
9/24 8:45AM	28.0
24 3:45PM	26.2
24 8:00PM	25.8
25 8:00AM	22.6
25 4.15PM	20.2
26 8:15AM	18.0
26 4:00PM	13.0
Shelled	13.8

Fig. 15—Typical test card for one bin of corn showing continuous reduction in moisture content (right column).

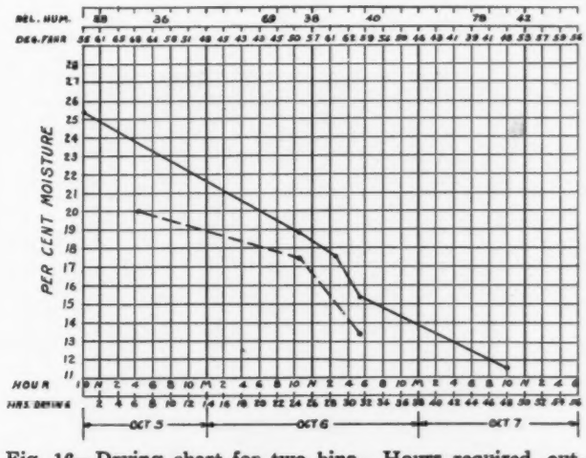


Fig. 16—Drying chart for two bins. Hours required, outside temperature and relative humidity from weather bureau. Note how one bin dried much more rapidly than the other.

from both the corn and the cob. It also shows that on completion of drying, the corn and cob have practically the same moisture content. If a drier is designed according to the amount of moisture to be removed, this test shows that about 30% should be added for moisture to be removed from the cob.

It sometimes happens that the vent doors from the duct into a bin of corn that is drying are closed

and the corn is not shelled immediately. When this is done the dry kernels of corn absorb moisture from the cob and a gain of moisture appears, as follows:

Final moisture test in bin	Moisture test after shelling
12.0%	12.4%
13.0	13.8
13.2	13.8
12.6	13.6
12.0	12.5
13.3	13.9

On the other hand, as tests are made during the drying process, the ears are taken from the center of the bin while the air is coming up from the bottom and just before reversing the air, as the air was reversed every two hours. This method of taking samples gives a slightly higher moisture test than the average of the bin because the drier corn is on the side of the entering warm air. When a bin is shelled immediately after closing vents from the air duct, differences appear as shown below:

Final moisture test in bin	Moisture test after shelling
13.5%	13.1%
13.9	13.0
12.4	11.8
13.1	12.5
13.6	12.6
13.2	12.8

The South drier having the more positive air circulation because of the backward curved bladed blower, shows a greater variation than the North drier with the multi-bladed blower.

Fig. 17 shows the west end of the South drier.

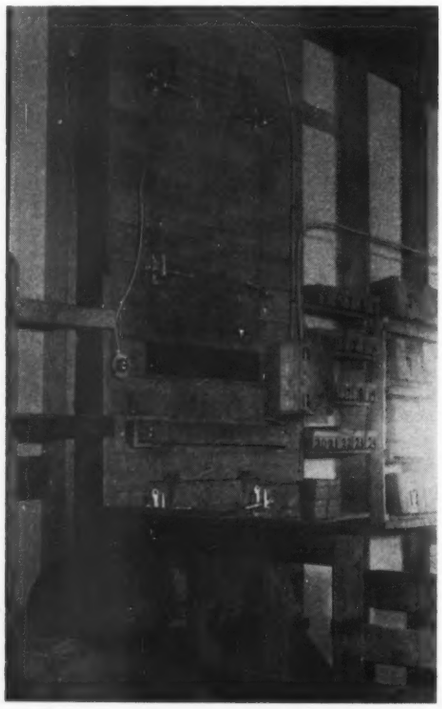


Fig. 17—Refrigerator latches are used on doors leading to air ducts.

The two doors with refrigerator catches are the openings to the main air ducts and are used in obtaining samples from the bins while drying for testing and are also used when the vents from the bins are to be opened or closed. The inside of these doors are shown at the end of the duct in Fig. 6. The switch to the left in Fig. 17 controls the lights in the ducts while the wooden box to the right contains the thermostat reversing switches. The small numbered boxes correspond to the numbers of the bins in the driers and are used in bringing samples from the sheller for testing, while the larger boxes, also numbered to correspond to the numbers of the bins, are used when obtaining samples from the bins while drying to be tested.

Bin Loads per Season

The number of times each bin can be used during the drying season depends on how soon it is filled after shelling out. The following shows the number of times one bin was used during only part of the drying season:

Bin 8 in North Drier

Moisture test at start	Started	Bins on	Shelled	Final Test
23.6%	10/5...3:20 P. M.	4..10/7	6:15 A. M.	12.4%
26.0%	10/7...4:00 P. M.	3..10/9	9:00 A. M.	12.6%
26.2%	10/9...4:45 P. M.	4..10/11	6:30 A. M.	13.1%
21.4%	10/11..6:00 P. M.	5..10/12	10:30 A. M.	13.0%
33.6%	10/12..5:30 P. M.	5..10/14	4:00 P. M.	13.8%
28.2%	10/14..7:30 P. M.	4..10/17	7:00 A. M.	13.0%
26.0%	10/18..2:30 P. M.	3..10/20	6:00 A. M.	13.2%
25.2%	10/20.11:00 A. M.	5..10/22	10:00 A. M.	13.5%
23.5%	10/22..3:30 P. M.	6..10/23	11:30 A. M.	13.8%

18 day period—Bin used 9 times

During the handling of ear corn a certain amount will shell off and cannot be stored because of the high moisture content. In the South drier it was customary to dump some shelled in with the ear corn at times. In order to test the bin method for this type of drying, two bins were used. The first bin contained 80 bushels and was reduced from 18% to 13.8% in 15½ hours while the second contained 92 bushels and was reduced from 23% to 13.4% in 38 hours. There being no cob, the corn packs tight and has to be turned over by hand, in the second bin four times. As the corn was about 35 inches deep in the bin no air could penetrate and the corn was dried by the heat in the air, the moisture rising to the top of the bin and being carried off by the syphoning effect of the return air.

Warming Up Bins

At the start of the drying season the bins have to be warmed up and the personnel must learn the mechanics of operating the drier. The first time the bins are operated the drying is slower as shown:

Initial Drying		After Warming Up Bins	
Moisture in corn.....	34.3%	Moisture in corn.....	32.0%
Shell test	12.0	Shell test	12.4
Moisture removed	22.3%	Moisture removed	19.6%
Drying time 73½ hours		Drying time 44½ hours	
Moisture in corn.....	28.6%	Moisture in corn.....	31.9%
Shell test	11.8	Shell test	13.1
Moisture removed	16.8%	Moisture removed	18.8%
Drying time 80½ hours		Drying time 42½ hours	

(*Continued on page* 46)

Your comment or experience is invited.

THE PROBLEM CORNER

Galvanized Over Old Roof

American Artisan:

I have a problem in roofing. The present roof was originally tar and gravel. This was later re-roofed with composition roll roofing nailed along the edges. The sun loosened the roofing and the roof went bad. Also the original roof had been hot mopped and it is impossible to remove it now.

The present roof does not have sufficient pitch for a standing seam roof. My question is: If the present roof is left in place as is and a new roof framing laid over it using new materials and a galvanized iron roof laid over shiplap sheathing, will the fumes and vapors rising from the old roof have any effect on the gavanized iron? There will be about 3 feet between the roofs at one end; less on the low end and absolutely no ventilation.

I have thought of putting a new wood roof deck over ⅞-inch furring strips, then a layer of asbestos paper and then a flat lock, 40-pound tin roof, but am afraid of the chemical action.

W. S. L., Oklahoma.

Reply by
Richard E. Mansfield,
James Mansfield & Sons Co.,
Chicago.

It is our opinion that to lay a new metal deck over the present roofs should be satisfactory in that the chemical reaction of this dead air space would not affect the metal. However, there is a possibility that there would be objectionable odors particularly in very hot weather. The best method, of course, is to remove the old roof and this we believe can be accomplished even though same has been mopped solidly to the decks below, by taking the roofs off on a cool day and flooding the roof area with cold water before removal.

Reply by
J. Dersher,
Toledo, Ohio.

A metal roof over pitch has never worked out to advantage. The life of any metal roof over pitch is only about three years. Your reader states in his letter that he will have an elevation of about three feet over the old roof at the high point. I suggest to install some small ventilators in the new roof that would take care of any gas that may accumulate between old roof and the sheeting and believe that this will answer his purpose. The vents should be at least 6 inches in diameter and there should be one to every 400 square feet of roof space.

Reply by
James F. Keays,
United Roofing Co.,
Albany, N. Y.

I would interpret this man's letter to mean that he would like to apply a metal roof and if he does he will build up the roof deck.

I do not know of any chemical action that might injure the tin; but it is customary for metal roofs to have ventilation. Now, if he cannot provide it with ventilators in the roof, he should rip off the roof boards and go at it from a new building angle.

Reply by
H. A. Daniel,
Atlas Roofing Co.,
Newburgh, N. Y.

We note that the building had a tar and gravel roof and that later roll roofing was put on and that this has become unsatisfactory.

We would recommend that a built up roof be put on top of the present roof *if* the slag or gravel was thoroughly cleaned off the old roof before the ready roofing was put on.

If this was *not* done we would recommend the removal of the ready roofing and the careful "spudding" of the original roof to remove any slag or gravel which might remain on same.

Then a new 3 or 4-ply roof should be put on over the old roof.

We prefer a roof built up of high grade asphalt saturated felt and natural asphalt, with the surface mopped and left smooth.

After laying the roof a metal eave stop should be put around all the edges with a flange at least 4 inches wide on the roof.

This should be mopped to the top surface of the new roof and then the flange should be mopped over with hot asphalt and covered with a layer of asphalt saturated felt 8 inches wide extending out on top of the exposed roof 4 inches.

This should be mopped over and another layer of asphalt 12 inches wide, should be rolled into the hot asphalt. This will lap 4 inches further on the roof than the first layer.

The surface of this felt strip should then be mopped along with the top mopping on the entire roof.

Method No. 2

If the present roof has been patched up with plastic, as many such roofs have, it might not be advisable to put the new roof over the top of the existing two roofs, but a good job could be obtained by laying ½-inch or 1-inch insulating board over the top of the existing roof and applying the new roof on top of that.

This could be shimmed up where necessary to provide a smooth surface for the new roof and it would have considerable insulating value.

Possibly your correspondent is not located in a section where there is a good built up roofing contractor. If that is the case he may have to resort to the standing seam metal roofing.

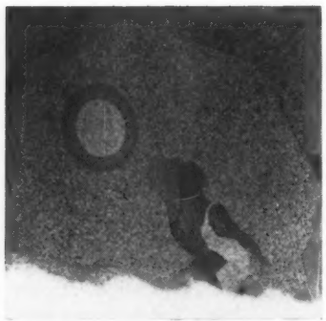
Of course that would be a rather expensive job as he seems to contemplate putting on new rafters and new sheathing so as to give the roof more pitch.

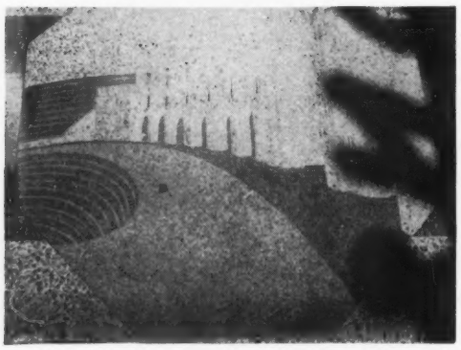
If he covers the new sheathing with a layer of waterproof felt containing no injurious ingredients, and gives this felt a lap of 3 or 4 inches, it should provide good protection below the new metal roof and would I feel sure, prevent any injurious effects.

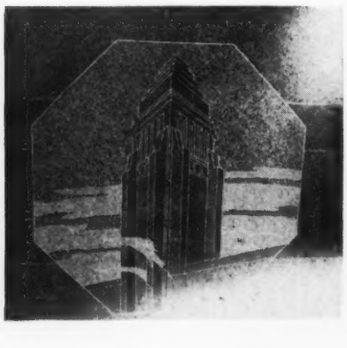
Felt such as Bird's Black Neponset, or waterproof Sisalkraft, would give good protection.

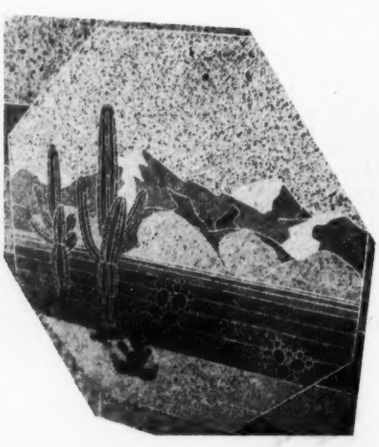
With a fall of 2 inches to the foot a well laid standing seam tin roof with seams 1 inch high should give satisfactory service.

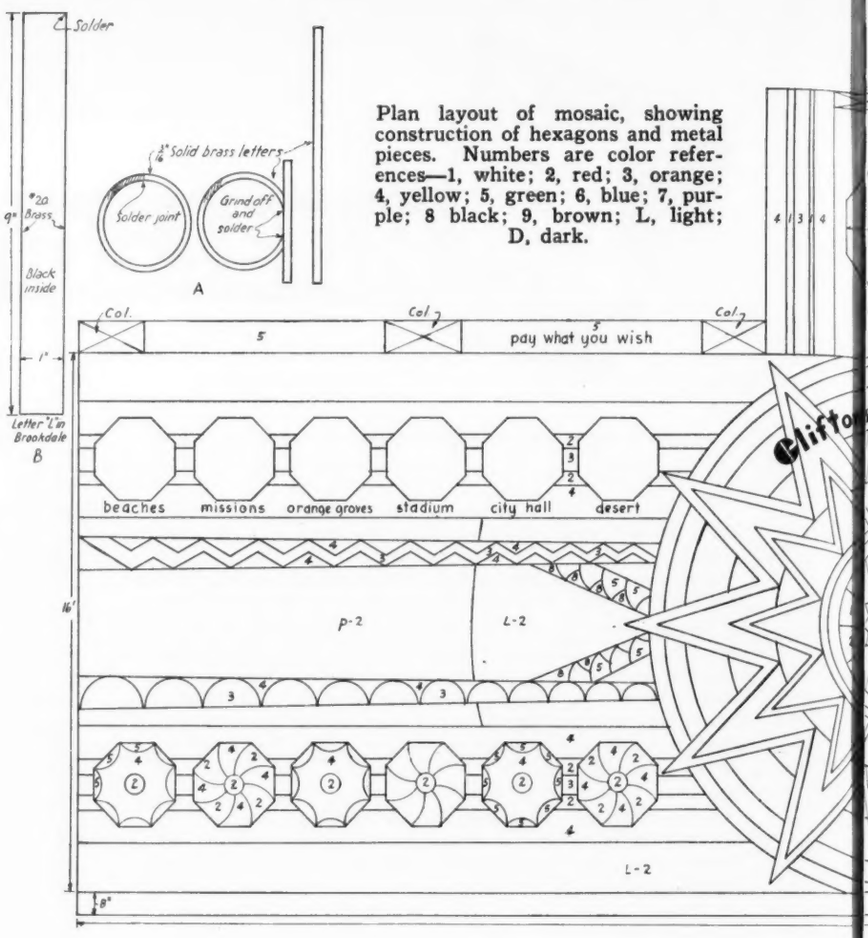
From the top, down and around, the mosaics on this page show: 1—a beach scene with three swimmers; 2—California missions with a Mexican guitar player; 3—orange groves with a background of snow covered mountains; 4—a stadium with arches, flags, etc.; 5—Los Angeles City Hall; 6—a desert with cactus and mountains.









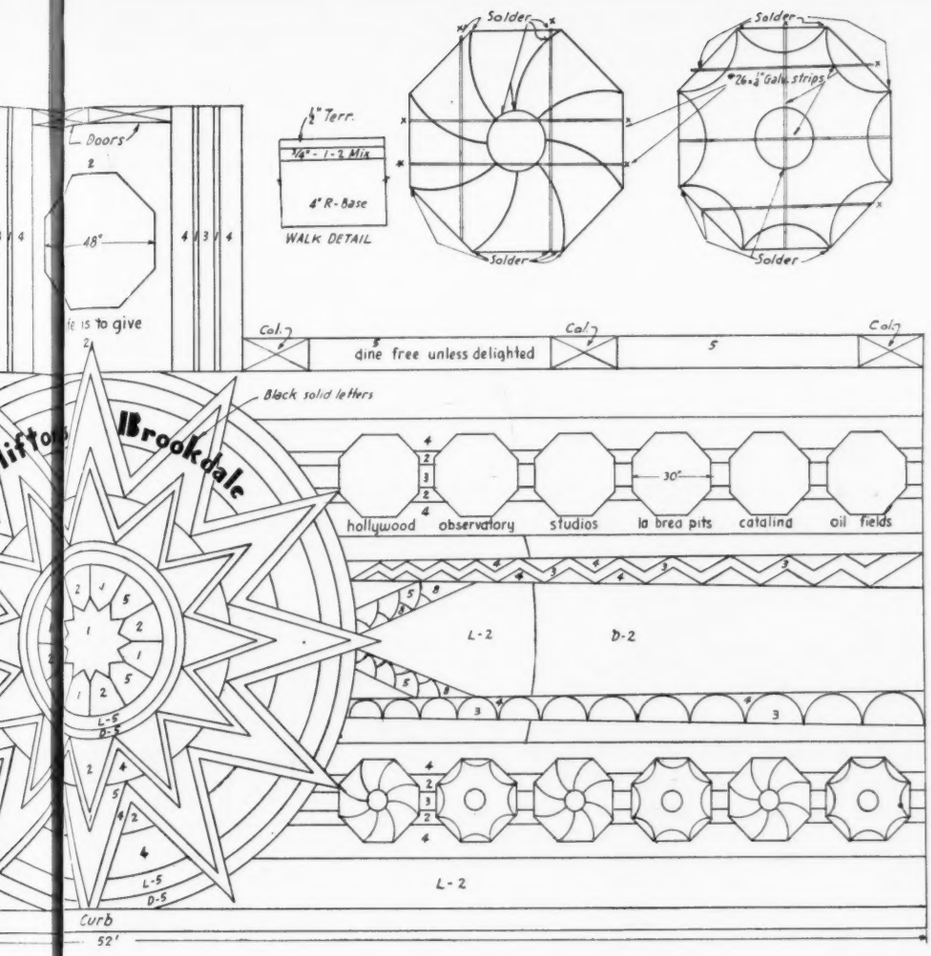


Plan layout of mosaic, showing construction of hexagons and metal pieces. Numbers are color references—1, white; 2, red; 3, orange; 4, yellow; 5, green; 6, blue; 7, purple; 8 black; 9, brown; L, light; D, dark.

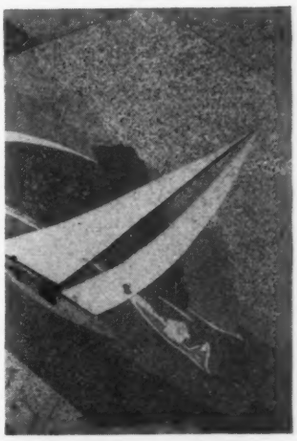
Sidewalk Mosaics

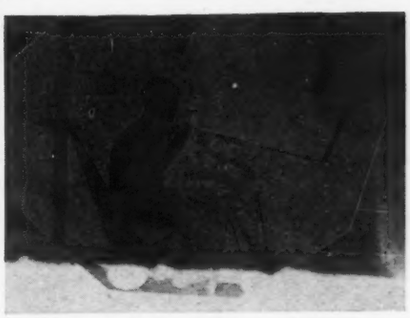
CALIFORNIA, mother to many unique ideas in advertising, has introduced another interesting advertising medium—sidewalk mosaic. And, as has been the case in numerous California advertising ideas, the sheet metal contractor finds sidewalk mosaics very much within his range of activities. Quite a number of California concerns have adopted this mosaic idea, finding that these brightly colored sidewalks cause passersby to stop, study and associate the store with the mosaic. As one store owner says: "These mosaics with their bright colors and interesting scenes bring in many a new customer who otherwise would not notice our store."

The basic plan of these sidewalks is to form up from strip brass or other metal a scene in which each part of the drawing is reproduced in colored terrazzo. The different colors are kept intact by the metal strips which form the pattern.



From top, down and around, the mosaics on this page show: 12—oil fields with derricks, tanks; 11—Catalina Island from a sail boat; 10—La Brea pits with historic animals; 9—movie studios with a sound and color camera; 8—Griffith Park observatory; 7—Hollywood, typified by the Hollywood bowl and band shell.



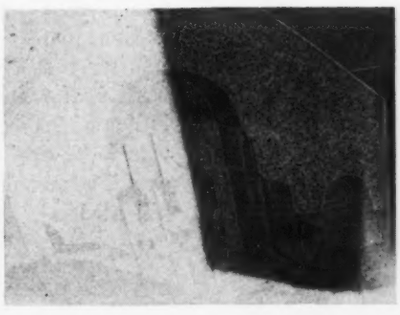


by a sheet metal contractor

By Frank E. Hawkins, Los Angeles

Therefore, it is necessary for the strip metal pattern to faithfully reproduce the outline of every part of the original drawing. This, in turn, means many small and intricate metal pieces, all carefully soldered together. A typical mosaic will explain how the idea is executed.

Located on Broadway near Seventh St. is Clifton's Brookdale Cafeteria which has one of these advertisements. The various designs are made in sections and placed in their respective positions. The hexagons are made according to the sketches. Each hexagon is a complete unit in itself. The lower sections or hexagons are made of No. 20 gauge, half hard brass. The brass is purchased in standard widths and lengths and is cut 1¼ inches wide for the various pieces in the designs. The strips are then



bent or curved and soldered in place at the joints and at the intersections. No lumps of solder are allowed at the joints, as this may cause the terrazzo near the top to show solder spots which ruins the bright brass designs and the terrazzo edges. The solder must be thoroughly sweated in the joints. Each section of the design has strips of 26-gauge galvanized iron soldered across the bottom to brace the panel and hold it true, (see X in designs).

All the designs are made from the architect's full scale blue prints. A blue print is nailed on a flat board. Then the galvanized iron brace strips are nailed down and the design is assembled piece by piece, following the architect's blue print. Each piece is soldered together and soldered onto the brace strips. When finished the whole design is complete. Then the small nails used to hold the brace strips are removed and the design is finished.

The hexagons near the building are constructed differently. The borders are made of No. 20 gauge half-hard brass strips 1¼ inches wide; however, the designs within the No. 26-gauge brass frames are only ½ inch wide and are bent with small tweezers in small pieces and soldered in place.

The titles beneath the pictures are of half-hard brass $\frac{3}{16}$ x 1¼ inches and are made as shown in the detail. The other letters and titles are the same, except the "Brookdale" sign which is constructed as shown in sketch B.

The various other designs are made in separate units, such as the stars, "W" runs and others.

After all the designs are made, a base of 4 inches of concrete is poured on the walk. Next above the base ¾ inch of soft, slow-drying cement is poured (1-2 mix), then the designs are placed in the walk. The brace strips now play their part of keeping the designs square and true while they are moved about and shifted in the cement to their proper positions. After the cement is hard, terrazzo mix of the proper color is poured in its proper place. This colored surface, ½ inch thick is allowed to dry; the walk is then sanded and polished. In this process from ⅛ to ¼ inch of surface is ground off the entire walk to make it perfectly smooth. The surface is then polished.

The various designs near the building are miniatures of scenes in the city. The various colors are as follows: L-light, D-dark, No. 1 white, No. 2 red, No. 3 orange, No. 4 yellow, No. 5 green, No. 6 blue, No. 7 purple, No. 8 black, and No. 9 brown.

Seed Corn Drier

(*Continued from page* 42)

The first comparison was from the North drier and the second was from the South drier which shows that this is true of both driers.

The drying was progressing rather slowly in the North drier because of the incomplete control of the air, so upon recommendation, the fan was speeded up from 432 rpm. to 484 rpm. This was permissible because the blower was already being operated by a 15-h.p. motor and could handle the increase. The effect of speeding up the blower is shown by the following:

Before Increasing Speed of Blower

Drying Time	Moisture at start	Shell test	Av. % per hr.
76 hrs.	29.5%	13.9%	.205
66¼ hrs.	29.0	13.9	.228
55½ hrs.	28.0	13.8	.256
71¼ hrs.	28.4	13.9	.203

After Increasing Speed of Blower

Drying Time	Moisture at start	Shell test	Av. % per hr.
44½ hrs.	32.0%	12.4%	.440
45½ hrs.	32.0	13.5	.407
46½ hrs.	33.6	13.8	.426
21½ hrs.	24.1	13.9	.474

Static Pressure Readings

The total static pressure required to move the air depends on the depth of corn and presence of foreign material such as husks and silks, the rate of air movement, and the frictional losses through the ducts, openings, fan and furnace.[2] Actual experience indicates that under average conditions the static pressure should be reckoned at 1¼ inches.[1] No static pressure tests were made in the North drier but two were made in the South drier. These were quite low as the corn was clean, all husks and silks having been removed. The first test was made while 8 bins of corn were drying, the U tube showing ¾ of an inch. With 6 bins drying the static pressure was ⅝ of an inch. These tests included the pressure in the entire system (not the corn alone), including the bins, 18% moisture corn, ducts and furnace. From this it will be seen that if the static pressure of 1¼ inches is used in selecting the volume of the blower, ample air will be delivered if operated at the rated speed and it may be necessary to change the pulley and slow down the blower.

The temperature of the drying air is very important and the temperature should not be allowed to exceed 110° F., but the nearer it can be kept at 110° F. the more rapid the drying and the more economical the process. If automatic stockers are used then automatic temperature control by means of thermostats should be installed.[1] Quoting from a letter received from Professor R. H. Reed, University of Illinois, "Last year we got no injury at 110° and 120° F.; no injury at 130° where the corn was 27% or lower at the start and the humidity was low and drying therefore, rapid; and only 4% kill at 150° where the corn was 24% at the start

(*Continued on page* 90)

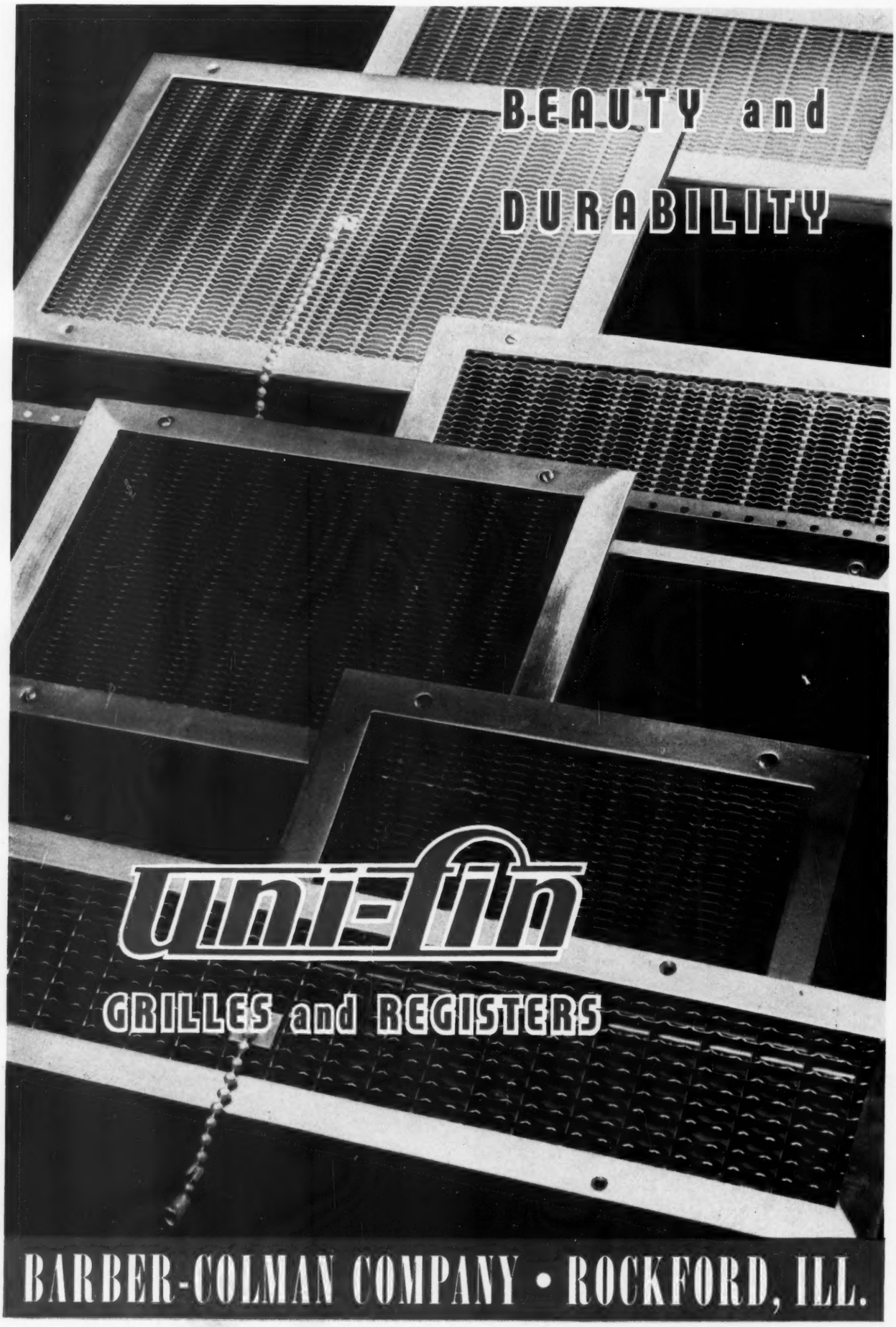
EVOTED

RESIDENTIAL AIR CONDITIONING SECTION

AN article in this month's section reviews the principles underlying a campaign to acquaint the public with "window conditioning"—a catchy phrase, but only a name for storm sash or double glazing. Our industry should be interested in backing this campaign because it assists in giving home owners two things we consider essential—higher relative humidities indoors and elimination of cold wall areas.

The report on two-speed blower operation in the Research Residence is valuable data. Many contractors have felt for a long time that intermittent fan operation leaves much to be desired—the findings of the research staff should supply the facts necessary to prove that the benefits far outweigh any small additional cost for electric current.

And right along this line, the description of the five-zone, constant fan operating system in Kansas City shows what can be done when a good design is not handicapped by cost.


BEAUTY and
DURABILITY
UNI-FIN
GRILLES and REGISTERS
BARBER-COLMAN COMPANY • ROCKFORD, ILL.

Intermittent vs. Two-Speed Blower Operation in Research Residence‡

By A. P. Kratz* and S. Konzo**
University of Illinois

IN the design of a duct system for a forced-air heating plant the assumption is tacitly made that the operation of the fan will be continuous. Although continuous operation of the fan is commonly used in practice for large heating installations, in a large majority of the smaller installations the greater electrical cost accompanying continuous operation has resulted in the extensive use of an intermittently operated fan controlled from a master room thermostat. In certain types of large installations and under extreme weather conditions the latter method of fan operation may not prove to be entirely satisfactory, as has been indicated in the preceding section. Hence a method of operation which combines long operating periods for the fan with reasonable electrical costs is worthy of investigation. Such an investigation of the performance of a two-speed fan in a forced-air heating system was made during the heating season of 1936-1937. It should be noted that the purpose in using two-speeds for the fan was to vary the volume of air delivered, and that this could also be accomplished by using dampers to control the output of a single-speed fan. The results obtained were compared with those obtained with the usual single-speed, intermittently operated fan.

Method of Conducting Tests

In the tests made with a single-speed fan (Series 2-36), the speed of the fan was adjusted by means of a variable diameter pulley so that the air delivery was maintained at 1,675 c.f.m. In the tests made with the two-speed fan (Series 1-36), the same high speed was retained so that an air delivery of 1,675 c.f.m. was obtained, and a low speed was selected such that an air delivery of 1,000 c.f.m. was obtained. In this particular installation it was not possible to obtain a lower fan speed and hence a lower air delivery. It is of interest to note that this air delivery at low-speed, amounting to 1,000 c.f.m., or approximately 60 per cent of the delivery at high speed, was materially higher than the normal air deliveries obtained with the gravity warm-air furnace in the Research Residence. In the latter installation, air deliveries ranging from approximately 500 c.f.m. to 800 c.f.m. were reported.[6]

In the case of the tests with the single-speed fan operated intermittently, the control[7] of the heating plant was accomplished by means of a room thermostat operated to start and to stop the combustion process and the circulating fan as shown in Fig. 1. This room thermostat was used in conjunction with two bonnet thermostats, one of which served to stop the fan when the bonnet air temperature be-

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**Special Research Assistant Professor, Engineering Experiment Station, University of Illinois.
‡A paper—"Study of Methods of Control and Types of Registers as Affecting Temperature Variations in the Research Residence," published in *Heating, Piping and Air Conditioning*, Dec., 1937, and presented at the 44th Annual Meeting of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, New York, N. Y., January, 1938.

[6]University of Illinois, *Engineering Experiment Station Bulletin* No. 189, by A. C. Willard, A. P. Kratz, and V. S. Day, Investigation of Warm-Air Furnaces and Heating Systems, Part IV., January 8, 1929, p. 56.
[7]Loc. Cit. See Note 3, Feb., 1938.

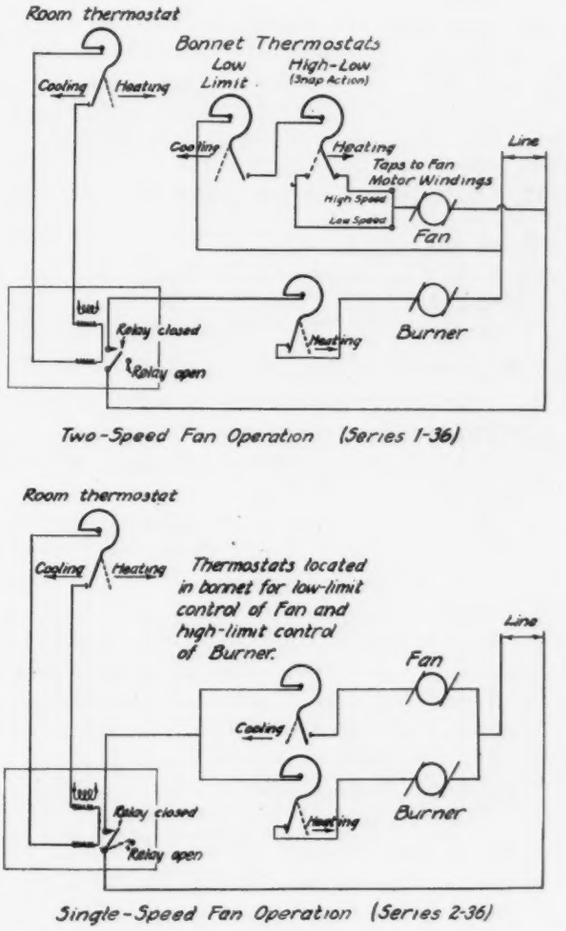


Fig. 1—Simplified wiring diagrams for two methods of control.

came less than 125 F., and the other of which served to stop the burner when the bonnet air temperature became greater than 175 F. The room thermostat, which was of the heat-anticipating type, was located on an inside wall of the dining room at a height of 30 in. from the floor and was adjusted to maintain an average air temperature of approximately 72 F. at the 60-in. level in all of the rooms of the Residence.

In the case of the tests made with the two-speed fan the room thermostat was not changed, but modifications were made in the electrical connections for the bonnet thermostats and also in the settings of the bonnet thermostats. The control of the heating plant was accomplished by means of the room thermostat operating to start and stop the combustion process only as shown in Fig. 1. When the bonnet air temperature was less than 125 F. the fan did not operate; when the bonnet air temperature was between 125 F. and 160 F. the fan was operated at low speed; and when the bonnet air temperature exceeded 160 F. the fan was operated at high speed. In both series of tests the same control instruments were used in order to eliminate any effects due to differences in the sensitivity and setting of the instruments; and the same electric motor (½ h.p. capacitor type, 110 volts, 60 cycle, 1,140 r.p.m. maximum speed) was used for the fan in order to eliminate effects due to differences in motor characteristics.

Either periodic or continuous records were made of all significant temperatures in the rooms and in the duct system as explained in the September issue. In addition to the temperature records, complete data were obtained for each 24-hour test period on the fuel consumption, the total integrated time of operation of the fan and of the burner, the total electrical energy consumption of the fan and of the burner, and the total number of both the off-periods and the on-periods of the circulating fan.

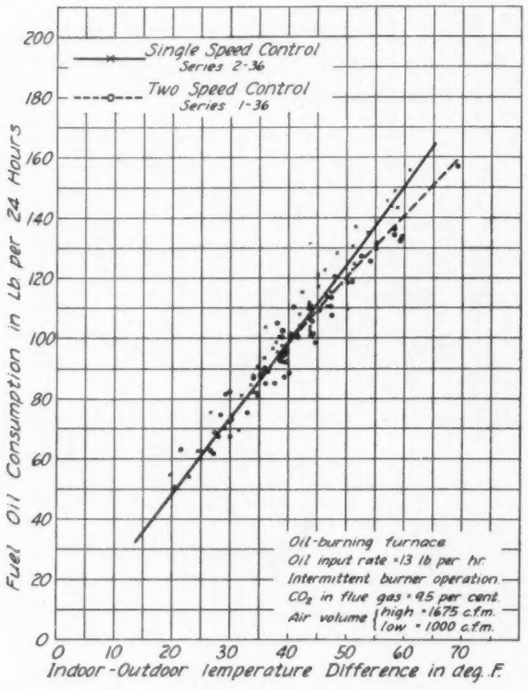

Single Speed Control
Series 2-36
Two Speed Control
Series 1-36
Fuel Oil Consumption in Lb per 24 Hours
Indoor-Outdoor Temperature Difference in deg. F.
Oil-burning furnace
Oil input rate = 13 lb per hr.
Intermittent burner operation
CO2 in flue gas = 9.5 per cent
Air volume high = 1675 c.f.m.
low = 1000 c.f.m.

Fig. 4—Fuel oil consumption for two methods of control

Limitation of Results

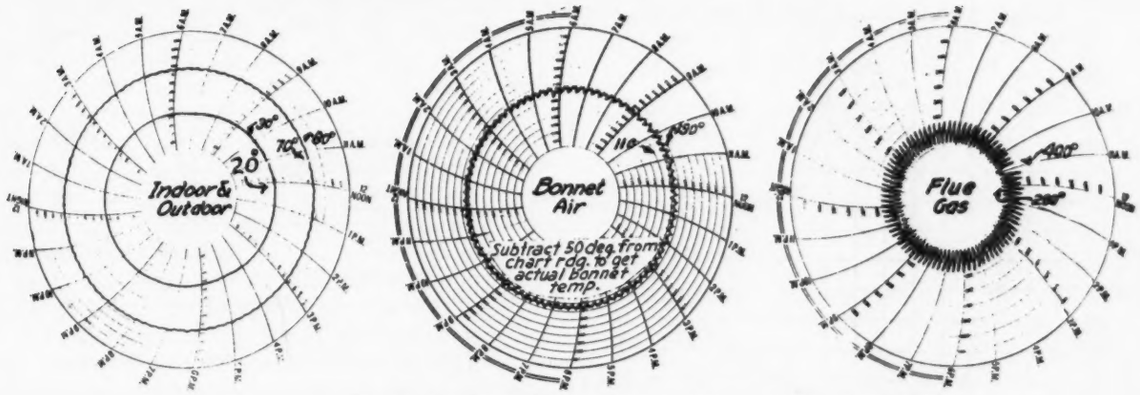
It should be recognized that the results obtained in these tests were influenced to a large extent by the conditions which were imposed and by the performance of the equipment used. For example, the selection of 1,000 c.f.m. delivery for low speed operation of the two-speed fan was quite arbitrary, and the results obtained would have been modified slightly if a delivery either greater or less than this had been used. Also the relative power costs for a two-speed fan motor and a single-speed fan motor would be dependent on the special characteristics of the motor used. These restrictions and limitations which apply to practically all tests made under similar service conditions do not, however, invalidate the results obtained, provided that the operating conditions do not deviate too far from those which would be considered as normal in ordinary applications.

Fuel Consumption

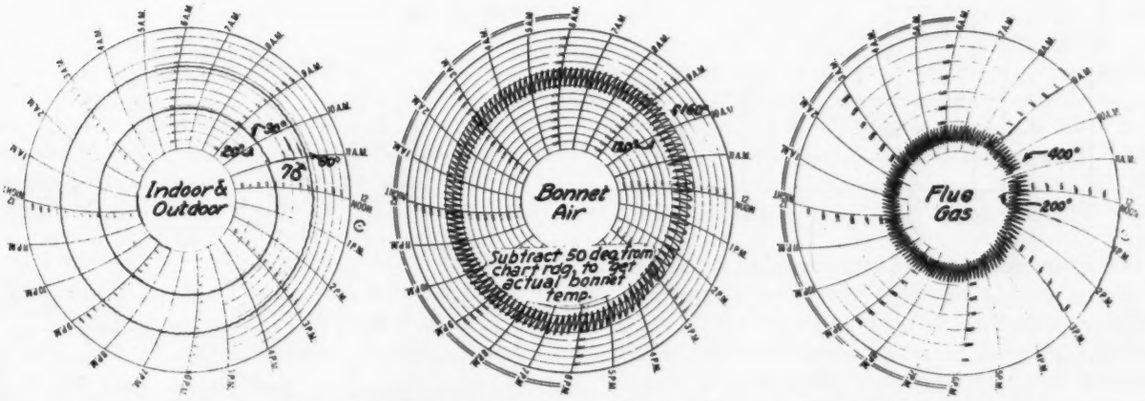
The operating conditions which were maintained for the oil burner and the oil-burning furnace were identical in the two series of tests. The oil input rate was approximately 13 lb. per hour, the air supply to the burner was adjusted to maintain 9.5 per cent of CO_2 in the flue gas, and the draft in the combustion chamber was maintained at 0.02 in. of water gage. For both series of tests the data on fuel consumption were obtained for a wide range of weather conditions, and the consumption of fuel oil in pounds per 24 hours has been plotted against the difference in temperature existing between the indoors and the outdoors for the same period, as shown in Fig. 4. The plotted points deviate to some extent from the curve representing the average of the observed data, and these deviations can be attributed to the wind and sun effects which cannot be represented on a curve based on temperature difference alone.

It may be noted from Fig. 4 that the full line represents the data obtained with the single-speed fan, while the broken line represents that obtained with the two-speed fan. For milder weather conditions, or for indoor-outdoor differences less than 45 F., very little difference in the fuel consumption resulted with the two methods of operation. For colder weather, or for indoor-outdoor differences greater than 45 F., the fuel consumption with the two-speed operation was slightly less than that with single-speed intermittent operation. This reduction in fuel consumption varied from 3 per cent to 8 per cent for indoor-outdoor differences varying from 50 F. to 65 F. The reduction in fuel consumption obtained with lower fan speeds cannot be attributed to higher bonnet efficiencies maintained during the periods of burner operation, since previous tests[8] had indicated that the higher bonnet

[8]Loc. Cit. Note 2, Feb., 1938.



Two-Speed Fan Operation (Series 1-36)



Single-Speed Fan Operation (Series 2-36)

Fig. 5—Temperature records for two methods of control

efficiencies accompanied the larger quantities of air circulated over the heating surfaces. However, as may be noted from Fig. 5, the flue losses during the off-period of the burner were apparently lower with the two-speed fan than they were with the single-speed fan. In the latter case the fan was stopped at the same time that the burner was stopped, and the reserve heat in the furnace tended to raise the temperature of the air in the bonnet. However, in the case of the two-speed fan, the fan continued to operate for some time after the burner had stopped and the residual heat in the furnace was completely transferred from the bonnet to the rooms. It is probable, therefore, that with the two-speed fan operation the reduction in the loss occurring in the hot gases passing up the chimney during the off-period of the burner was equal to or slightly greater than the slight increase in these losses during the actual combustion process. Since the speed of the fan was low and the amount of residual heat was limited, the temperature overrun that accompanied these comparatively long periods of fan operation after the room was satisfied was not of sufficient consequence to be objectionable. The difference in seasonal fuel consumption for the two cases would be small, and for all practical purposes it may be concluded that the fuel consumption for the two methods of operation was essentially the same.

Burner Operation

The data obtained for the operation of the burner are shown in Fig. 6. It may be noted from the top pair of curves that with low speed operation the number of cycles of operation was materially less than that with high speed operation. Since the total time of burner operation per day was approximately the same in the two cases, as shown in the middle pair of curves, the average length of the on-period of the burner was greater with the lower fan speed. The latter may also be deduced from the flue gas temperatures shown in Fig. 5 The energy input to the burner motor was approximately the same for the two cases.

Table 2—Data on Operation of Two-Speed Fan

Indoor-Outdoor Temp. Difference in Deg F	Total Fan Operation in Hours		Increase in Running Time of Two-Speed Fan Operation Over Single-Speed Operation, Per Cent
	Single-Speed	Two-Speed	
20	3.9	7.3	87
40	7.8	14.2	82
60	12.0	20.6	72

Fan Operation

Similar data for the circulating fan are shown in Fig. 7. It may be observed that marked differences were obtained in the total time of fan operation for

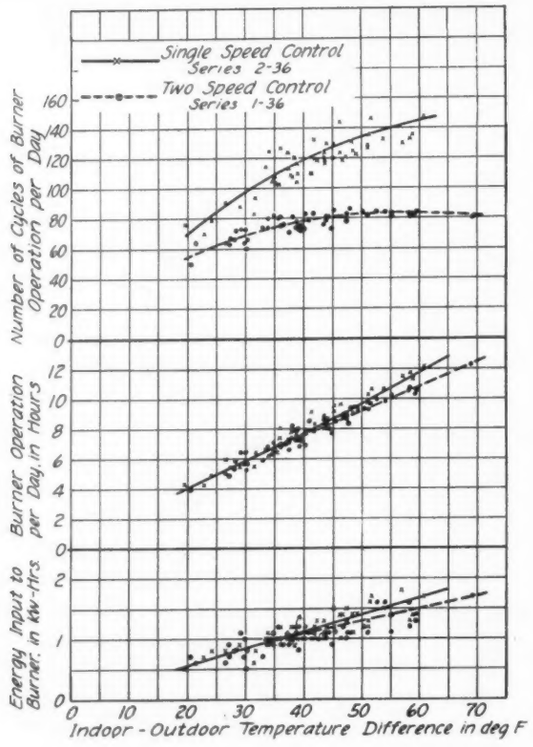

Single Speed Control Series 2-36
Two Speed Control Series 1-36
Number of Cycles of Burner Operation per Day
Burner Operation per Day, in Hours
Energy Input to Burner, in kw-Hrs
Indoor - Outdoor Temperature Difference in deg F

Fig. 6—Performance of burner with two methods of control

a 24-hour period, as is also indicated by Table 2. The total running time accompanying two-speed operation was approximately 80 per cent greater than that for single-speed operation of the fan. In fact for an indoor-outdoor temperature difference of 60 F. the fan operated 20.6 hours out of 24, or 86 per cent of the time, when the two-speed arrangement was used.

The average power consumption of the electric motor for the fan was 0.38 kw. with high-speed operation and 0.25 kw. with low-speed operation. In other words although 0.23 kw. was required per 1,000 c.f.m. delivery at high speed, as a result of slightly lower motor efficiencies at the lower speed, the rate at the low speed was 0.25 kw. per 1,000 c.f.m. delivery.

The total energy consumption with the two-speed fan operation was from 9 to 21 per cent greater than that for single-speed operation, depending upon the severity of the weather, with an average value of approximately 15 per cent. As indicated previously these comparative values are dependent to a large extent on the performance characteristics of the motor used.

In general when the costs for fuel, for burner power, and for fan power are all taken into consideration, the total daily operating costs for the two methods of operation may be considered as practically the same.

Temperature Differential in Rooms

The results of an analysis of the average room temperature conditions maintained in all of the rooms of the Residence are shown in Fig. 8, in which the data for the differences in temperature existing between the breathing level and the floor and between the ceiling and the breathing level have been plotted against the indoor-outdoor temperature difference. It may be observed that on the average, the temperature of the air near the floor with two-speed fan operation was approximately 0.4 F. higher than that obtained with single-speed operation, although no appreciable difference was observed in the ceiling temperatures. Furthermore, the average value of the register air temperature was approximately 104 F. with the two-speed fan owing to the preponderance of low-speed operation, and approximately 117 F. with single-speed operation. It is, therefore, probable that the lower temperature of the air introduced into the room during the longer periods of low speed operation may serve as an explanation for the slightly better average room temperatures that were maintained when the two-speed fan was used.

Off-Period of Fan

In the preceding discussion the differences in the results obtained with the two methods of fan operation have been shown to be comparatively small. However, a study of the temperature fluctuations

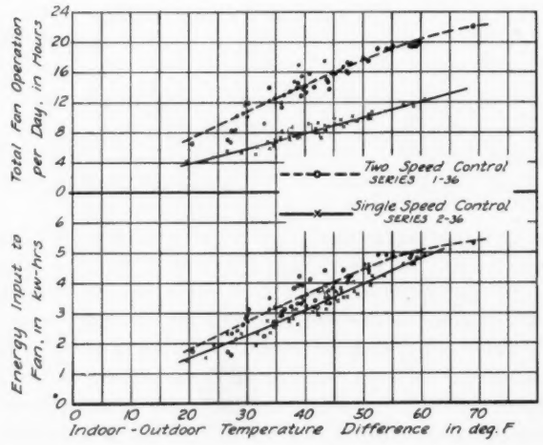

Total Fan Operation per Day, in Hours
Two Speed Control SERIES 1-36
Single Speed Control SERIES 2-36
Energy Input to Fan, in kw-hrs
Indoor - Outdoor Temperature Difference in deg F

Fig. 7—Performance of fan for two methods of control

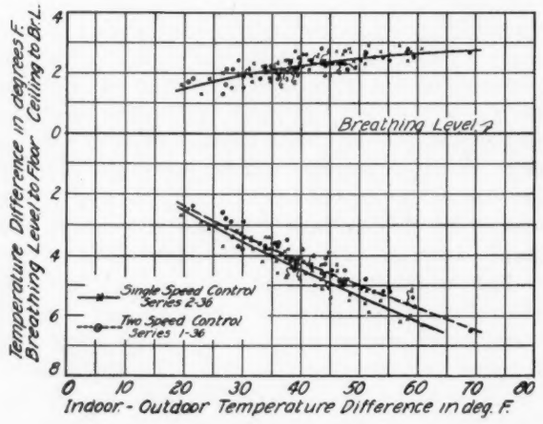

Temperature Difference in degrees F. Breathing Level to Floor Ceiling to Br.L.
Breathing Level
Single Speed Control Series 2-36
Two Speed Control Series 1-36
Indoor - Outdoor Temperature Difference in deg. F

Fig. 8—Room temperature differential for two methods of control

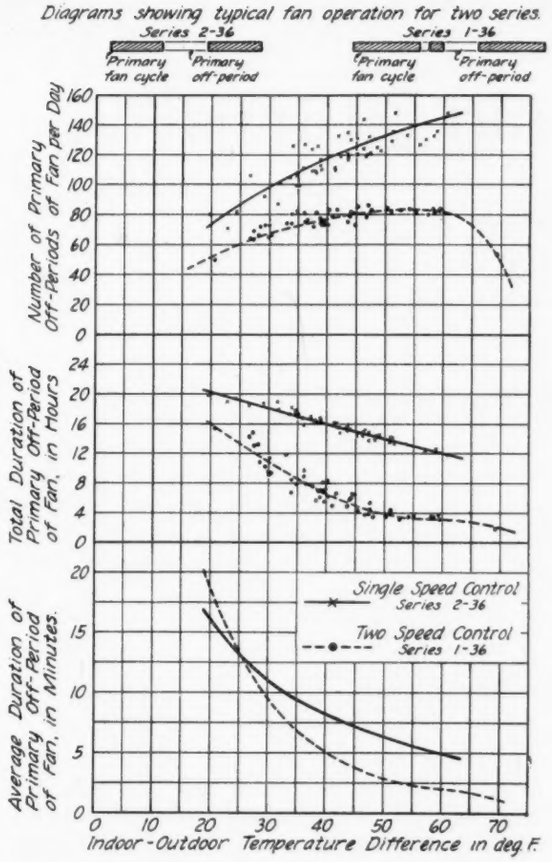

Diagrams showing typical fan operation for two series.
Series 2-36
Primary fan cycle
Primary off-period
Series 1-36
Primary fan cycle
Primary off-period
Number of Primary Off-Periods of Fan per Day
Total Duration of Primary Off-Period of Fan, in Hours
Average Duration of Primary Off-Period of Fan, in Minutes.
Single Speed Control Series 2-36
Two Speed Control Series 1-36
Indoor-Outdoor Temperature Difference in deg. F.

Fig. 9—Off-period duration of fan with oil-burning furnace

in any given room during a complete cycle of fan operation, as well as a study of the distribution of temperatures in the different rooms, has indicated that the comfort conditions in the room were markedly improved with the two-speed operation of the fan. In general, the conditions of discomfort occurred only during the off-periods of the fan, when no heat was being delivered to the room, and the effective temperature in the living zone had decreased to a value less than that which was considered as satisfactory. Obviously, improvements in the room comfort conditions could be effected by a reduction in the number of off-periods, in a reduction in the average duration of the off-periods, or in a reduction in both factors.

The upper set of curves in Fig. 9 shows the number of primary off-periods of the fan per day. As is indicated in the inset shown at the top of the figure, the primary off-period in the case of two-speed fan operation was regarded as the longer of the two off-periods that usually follow a primary fan cycle. It is this primary off-period, rather than the very short secondary off-period, that is of significance in this study. It may be noted from the upper set of curves that the number of primary off-periods per day was much smaller for two-speed fan operation than it was for single-speed fan operation. For example, for an indoor-outdoor temperature difference of 60 F. the numbers of off-periods were 82 and 145 respectively, for two-speed and single-speed operation.

The middle pair of curves shows that, in the case of two-speed operation, the total duration of time represented by the summation of the primary off-periods per day was also less than for single-speed operation. For an indoor-outdoor temperature difference of 60 F. the durations were 3.0 hours and 12 hours, respectively.

The lower pair of curves in Fig. 9 shows the average duration of the primary off-period of the fan. It may be noted that for both series of tests the average duration of the off-period diminished as the weather conditions became more severe. For an indoor-outdoor difference of 60 F. the average durations of the primary off-periods were 3 min. and 5 min. respectively for two-speed and single-speed operation. Hence, from the standpoint of fewer number of off-periods per day and also from that of shorter duration for each off-period, it may be concluded that the heat supply to the rooms was more nearly continuous and that conditions were more favorable in the case of two-speed fan operation than in the case of single-speed operation.

Temperature Variation in Rooms

It was also observed that more nearly continuous and uninterrupted heat supply resulted in better room temperature conditions. Studies of the variations in the temperature of the air during one complete cycle of operation of the circulating fan were made in the living room. This room was 13 ft. 6 in. by 20 ft. and had the north, east, and south walls exposed. The supply register was located in the baseboard of the inside west wall, midway between the north and south walls. The register used in this study was 10 in. by 12 in. of the perforated grille type, and introduced the air into the room at an angle of approximately 45 deg. from the horizontal. The return air grille, which was 30 in. by 8 in., was located in the floor in the north-east corner of the room.

Five preliminary tests were made including both high and low speed operation of the fan, and with the outdoor temperatures ranging between 4.5 F. and 17.0 F. Each test comprised one complete cycle of fan operation and was made in order to determine the amount of deviation occurring between the temperature in the center of the room and those observed in the four corners of the room. These preliminary tests indicated that the average deviations of the corner readings from the center reading were very small; amounting to +0.02 F. at the breathing level and —0.25 F. at the floor. Furthermore, these deviations were not affected to any extent by the changes in the fan speed. There was some indication that the northwest corner was slightly warmer than, and that the southeast corner was slightly colder than the other parts of the room. In general it may be concluded that the air temperatures observed in the center of a given horizontal plane in the room are representative of those prevailing at all points in the same plane in the room.

In a second set of tests the temperature varia-

(*Continued on page* 84)

Pattern Development for

Air Conditioning Fittings*

By William Neubecker
Head Instructor
Sheet Metal Department, New York Trade School

Compound, Double-Curved, Twisted, Offset Elbow

THE problem demonstrated in this article is a special fitting of a compound, double curved, twisted, offset elbow connecting to a rectangular duct having *equal area* throughout the entire fitting.

The method presented is a short rule, using radial and parallel lines in the development of the pattern shapes. The rule given is not geometrically accurate, but is perfectly acceptable for all practical shop work. Where this inaccuracy occurs will be explained as we proceed with the layouts.

Fig. 33 shows a scaled front and end elevation, also a plan of the problem. Here we have an offset joining to a duct 18 in. wide by 8 in. deep running along the ceiling line, then dropping down 16 in. to pass under the I beam and at the same time project toward the reader a distance of 16 in. as shown in plan so as to pass around the corner of the brick wall. The offset must make a quarter turn or twist, so as to bring the 8 in. depth in elevation to an 18 in. depth below the I beam and the 18 in. width in plan to an 8 in. width when it turns the corner wall. The length of the offset can be made as desired, in this case 46 in. as shown in elevation.

Regardless of the size of duct used, or what the drop or projection, or the length of the offset may be, the principles hereinafter explained are applicable to all conditions. The letters J in both plan and elevation indicate the joint lines between the offset and duct.

Fig. 34 shows how the pattern shapes are developed. When laying out the full size patterns in shop practice, it is not necessary to draw an elevation or plan. All that is required is an end elevation as shown at the right in Fig. 33 which is drawn to a larger scale in a reversed position in the end view in Fig. 34. Draw the two rectangular sections *R* and *S* in their proper positions to correspond to the dimensions of the drop and projection, making a twist or quarter turn as shown by comparing section *R* to section *S*. Number the corners in section *R*, 1 to *4* and in section *S*, 1′ to *4*′. Draw diagonal lines in both sections from opposite corners, crossing each other at *R* and *S* respectively. Draw the line from *R* to *S* which completes the end elevation.

Parallel to *R-S* draw the line *a-o*. At right angles to *a-o* establish the desired length of the offset indicated by the arrow point *o* to *F* and draw the line *F-Y* also parallel to *R-S*. From the corners 1 to *4* in section *R* at right angles to *R-S*, drop lines to intersect the line *a-o* at the top as shown. In a similar manner at right angles to *R-S* from the corners 1′ to *4*′ in section *S*, drop lines to intersect the line *F-Y* at the bottom. At pleasure establish the radius of the throat of the elbow and set it off at the top from *E* to *X* on the line *a-o*, also at the bottom from *i* to *Y* on the line *Y-F*. Using *Y* at the bottom as center with *Y-i* as radius, draw the throat arc *i-6* indefinitely. Using *X* at the top as center with *X-a* as radius, draw an indefinite heel arc *a-5*. Now draw a line through the points of tangency on the lower throat and upper heel arcs as shown from *e* to *f* and at right angles to *e-f* from the center *X* draw the line *X-e* meeting the point of tangency at *e*.

In a similar manner at right angles to *e-f* from the center *Y* draw an indefinite line to the right through the point of tangency at *f*. Now using *X* as center with radii equal to the various intersections previously obtained on the line *a-o*, draw arcs to intersect the radial line *e-X* at *4-3-1* and *2*. In a similar manner using *Y* as a center with radii equal to the various intersections previously obtained on the line *Y-F* draws arcs to intersect the radial line *Y-2*′, at *4*′*-1*′*-3*′ and *2*′. Connect corresponding corners *4* to *4*′*-3* to *3*′ -1 to 1′ and *2* to *2*′.

a-E-F-i-a is the true elevation of the offset elbow from which the various radii for developing the patterns are obtained. By referring to the true elevation it will be seen that the twist takes place between the upper and lower curves, so that in case the offset elbow is of a large size, it can be assembled in three parts. In other words *4-2-2*′*-4*′ will be the true elevation of a twisted duct, whose true sections are shown in line with *2-2*′, 1-*3*′*-3*-1′ and *4-4*′. Thus 1-*2-3-4* in the lower sections is a true section on the line *2-4* in the true elevation and 1′-*2*′*-3*′*-4*′ a true section on the line *4*′*-2*′ in the true elevation.

As the twisted portion *4-2-2*′*-4*′ in true elevation, will be laid out by parallel lines, it becomes necessary to find the true length of the flare or the length of the slant side, by taking the projection *t* in the sections in

*All rights reserved.

PATTERNS - FOR - COMPOUND - DOUBLE - CURVED - TWISTED - OFFSET TRANSITION - ELBOW - HAVING - EQUAL - AREA - THROUGH - OUT CONNECTING - TO - RECTANGULAR - DUCT

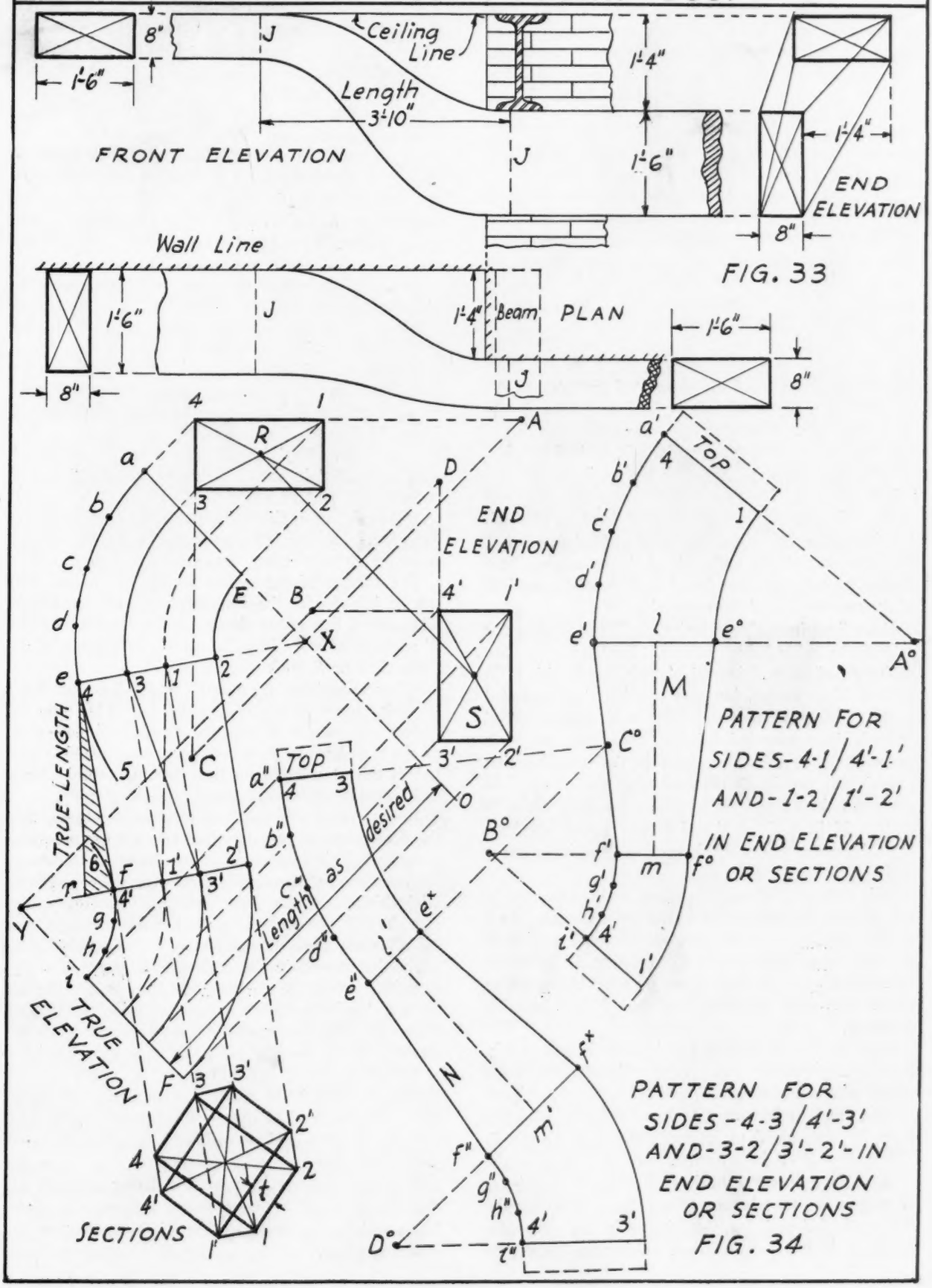


FIG. 33

FIG. 34

the lower left corner and set it off from *f* to *r* at right angles to the side *e-f* in the true elevation and draw a line from *e* to *r*, the desired length.

In this connection it is proper to say that the sections at the lower left corner are not at all necessary for finding this projection *t*, as it can be computed as follows: *t* represents one half the difference between the narrow and wide sides of the duct. Assume that the duct is 8 in. × 18 in. Then $\frac{18-8}{2} = \frac{10}{2} = 5$. The distance *t* would be 5 in. which would be laid off from *f* to *r* in the true length.

We are now ready to find the various radii, with which to strike the flaring pattern shapes for the upper and lower curves of the offset elbow as follows: At right angles to *a-X* in the true elevation, through the center *X* draw the line *C-A* indefinitely. Now extend the sides *4*-1 and *4-3* in the rectangle *R* until they intersect the line *C-A* at *A* and *C* respectively.

In a similar manner at right angles to *F-Y* in the true elevation, from the center *Y*, draw the line *Y-D* indefinitely and extend the sides 1'-*4'* and *3'-4'* in the rectangle *S* until they intersect the line *Y-D* at *B* and *D* respectively. The pattern for one of the sides of the center twist in true elevation will be laid out first and the flaring patterns for the curves joined to it.

Take the true length *r-e* in the true elevation and set it off in pattern *M* on the vertical line *l-m*. Through *l* and *m* draw horizontal lines and make *l-e'* and *l-e°* equal to one half the wide side of the rectangle. In a similar manner, make *m-f'* and *m-f°* equal to one half of the narrow side of the rectangle.

Draw lines from *e'* to *f'* and *e°* to *f°* to complete one side of the twisted duct pattern. Now with the flare radius equal to *4-A* in end elevation and with *e'* in pattern *M* as center, intersect the line *e'-e°* extended at *A°*. Using *A°* as center with radii equal to *A°-e'* and *e°*, draw arcs indefinitely. Now take the girth from *e* to *a* on the outer curve in the true elevation (which was previously obtained from the corner *4* in the rectangle *R*) and set it off on the outer curve in pattern *M* from *e'* to *a'* and draw a radial line from *a'* to the center point *A°*, intersecting the inner curve at 1.

This radius *A°*-1 in the pattern will, of course, be the same as the radius *A*-1 in the end elevation. In a similar manner, with the flare radius equal to *4'-B* in the end elevation and with *f'* in pattern *M* as center intersect the line *f°-f'* extended at *B°*. Using *B°* as center with radii equal to *B°-f°* and *f'* draw arcs indefinitely.

Now take the girth from *f* to *i* on the inner curve in true elevation (which was previously obtained from the corner *4'* in the rectangle *S*) and set it off on the inner curve in pattern *M* from *f'* to *i'* and draw a radial line from *B°* through *i'* to intersect the outer arc at 1'. This radius *B°*-1' in pattern *M* will of course, be the same as the radius *B*-1' in the end elevation. *4*-1-1'-*4'*-*4* or pattern *M*, then becomes the pattern shape for the sides *4*-1/*4'*-1' and 1-*2*/1'-*2'* shown in the rectangles *R* and *S* in the end elevation. Using the same procedure as just described, lay out the pattern shape for the sides *4-3*/*4'-3'* and *3-2*/*3'-2'* as shown in pattern *N*.

The length *l'-m'* in pattern *N* is obtained from the true length *r-e* in the true elevation. The distance *e"-e*ˣ in *N* is made equal to the narrow side of the rectangle and the distance *f"-f*ˣ equal to the wide side. With the flare radius equal to *4-C* in the end elevation and with *e"* in pattern *N* as a center, intersect the line *e"-e*ˣ extended at *C°*.

Using *C°* as center, with radii equal to *C°-e"* and *e*ˣ draw arcs indefinitely. Take the girth from *e* to *a* on the outer curve in the true elevation and set it off on the outer curve in pattern *N* from *e"* to *a"* and draw a radial line from *a"* to the center *C°*, intersecting the inner arc at *3*. This radius *C°-3* in the pattern *N* will, of course be the same as the radius *C-3* in the end elevation.

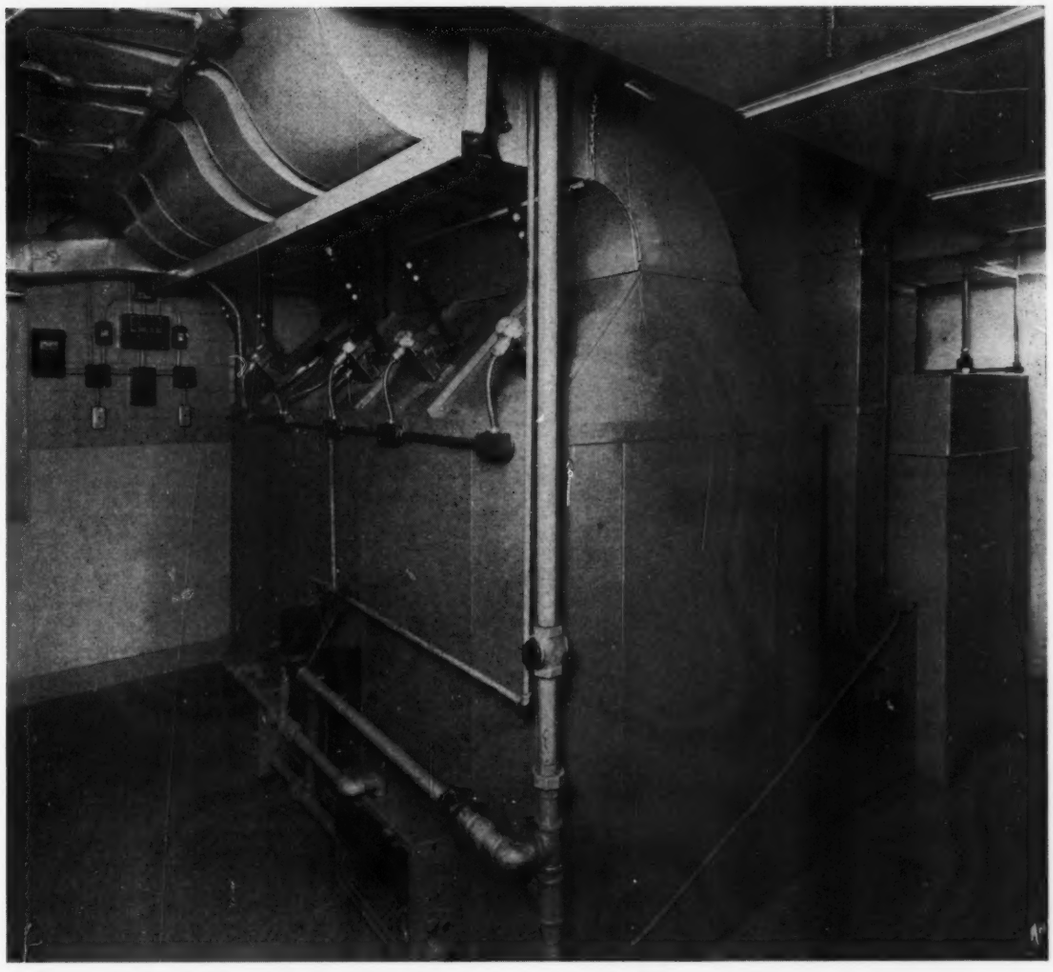
In a similar manner with the flare radius equal to *4'-D* in the end elevation and with *f"* in pattern *N* as a center intersect the line *f*ˣ*-f"* extended at *D°*. Using *D°* as center with radii equal to *D°-f*ˣ and *f"* draw indefinite arcs. Now take the girth from *f* to *i* on the inner curve in true elevation and set it off on the inner curve in pattern *N* from *f"* to *i"* and draw a radial line from *D°* through *i"* to intersect the outer arc at *3'*.

The radius *D°-3'* in pattern *N* will of course be similar to *D-3'* in the end elevation. *4-3-3'-4'-4* then becomes the pattern shape for the sides *4-3*/*4'-3'* and *3-2*/*3'-2'* shown in the rectangles *R* and *S* in the end elevation. Laps or edges must be allowed on all patterns for either riveting, seaming or soldering.

The corners of the middle section or twisted duct can be joined with the Pittsburgh or hammered lock. The dotted line edges shown at the top and bottom of patterns *M* and *N* can be turned for the use of the drive cleat or *S* hook connections.

When assembling the offset elbow, mark the "top" on both pattern *M* and *N* as indicated. Then join the corner *4* of pattern *M* with the corner *4* of pattern *N*, all the way down to *4'* on both patterns. Assemble both halves this way and then turn one half upside down and complete the two opposite corners.

In presenting this problem, mention was made that the demonstration just described was not geometrically accurate. This inaccuracy is explained by referring, for example, to pattern *M*. Note that there is a very slight kink at *e°* where the curve 1-*e°* connects to the straight side *e°-f°*. This occurs because the radial line *A°-e°* is not at right angles to *e°-f°*. The kink is so slight that it will not be noticeable in practical work, especially when the curves have large radii. In all pattern developments where arcs are joined to straight lines, they should meet at the point of tangency; as for example where the line *4-4'* in the true elevation joins at the point of tangency with the upper curve *a-5* and the lower curve *i-6* at *4* and *4'* respectively. Of course this could be worked out in the pattern shapes just developed, but would necessitate a lot of complicated projections from plan to elevation or *vice versa* by adding to, or subtracting from, the flaring patterns. All this labor would be unnecessary because the slight kinks which may occur are lost when the corners are joined together.



A Five-Zone, Gas System With Continuous Fan Operation

AMONG the many types of winter air conditioning systems offered the public, one system has usually been acknowledged superior where precise control of room temperature is required. In this system the fan operates continuously, at the same speed and hence insures a uniform rate of air change, while the register air temperature constantly changes to offset the heat loss of the room.

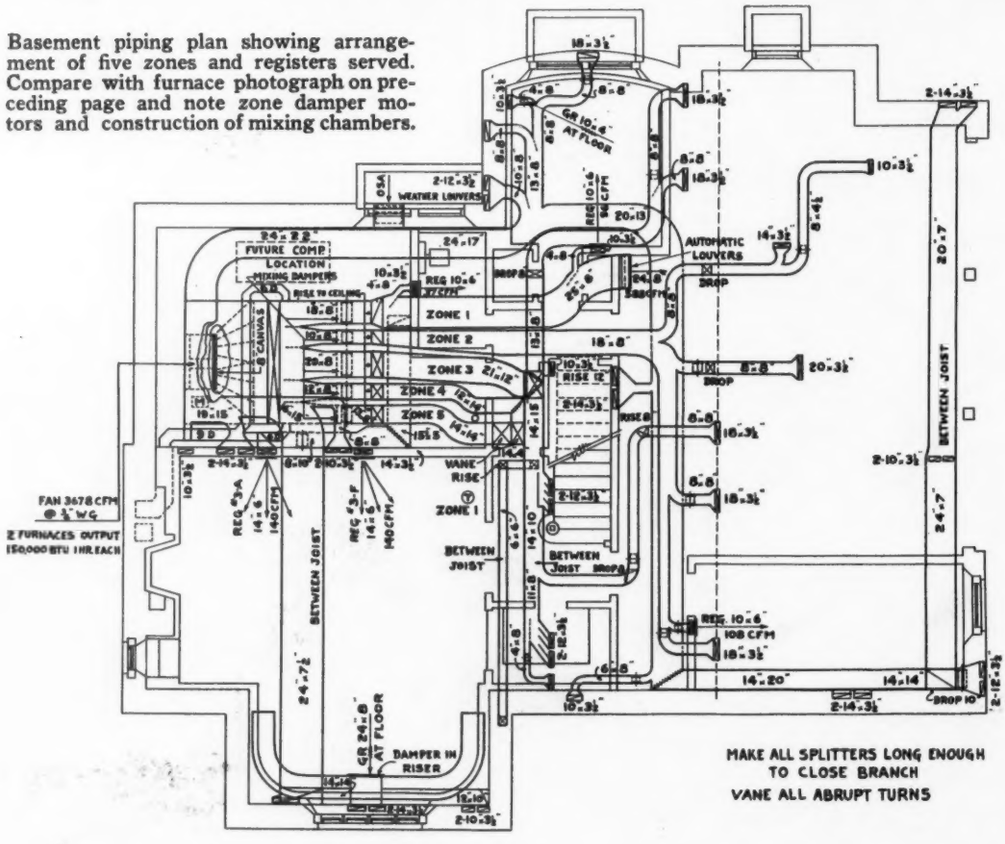
An elaborate installation employing this principle is shown in the photographs and floor plans of a residence built in Kansas City, Missouri by the J. C. Nichols Company, realtors. The system was engineered by David D. Zink, consulting mechanical engineer, Kansas City. Equipment was supplied and installation made by Security Stove and Manufacturing Co., Kansas City.

Mr. Zink, engineer, describes the system and its operation as follows: "This system was designed for continuous fan operation in order to minimize stratification, gravity overheating of some rooms and to insure uniform air change and precise temperature control. We have found this type of system vastly improves the conditions obtainable, insures adequate ventilation and temperature control with almost negligible increase in operating costs.

"The heat gain (cooling) and the heat loss (heating) was calculated for each room and the largest air capacity required governed the selection of duct sizes and size and arrangement of grilles. All grilles and registers were selected for proper direction and distance of throw for cooling. Cooling air volume was based upon a 15-degree diffusion temperature (difference between desired room air temperature and temperature of air issuing from register). All return air risers are provided with dampers to balance the flow of air and insure positive pickup from difficult rooms such as the recreation room and the most remote rooms.

"Gas furnaces maintain a constant bonnet temperature in the warm air plenum. Bonnet temperature controllers cut off first one-half of the burner capacity in each furnace, then, if the remaining one-half still provides too much heat, the last half is also cut off. This arrangement operates to maintain more even bonnet temperatures and prevents

Basement piping plan showing arrangement of five zones and registers served. Compare with furnace photograph on preceding page and note zone damper motors and construction of mixing chambers.



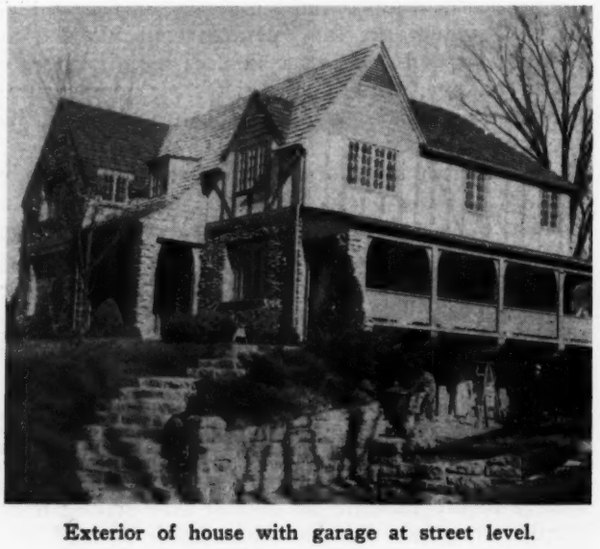
too frequent operation of the valves.

"The fan operates continuously during the daytime unless interrupted by the high limit thermostat. The temperature of the air entering each zone is modulated according to room temperatures by a Minneapolis Honeywell Modutrol thermostat and motor. A low limit control is provided in each zone to prevent objectionable low discharge air temperatures. At night a clock changes the operating system over to intermittent operation of both fans and burners. A manual switch also gives the owner optional control operation for very mild weather.

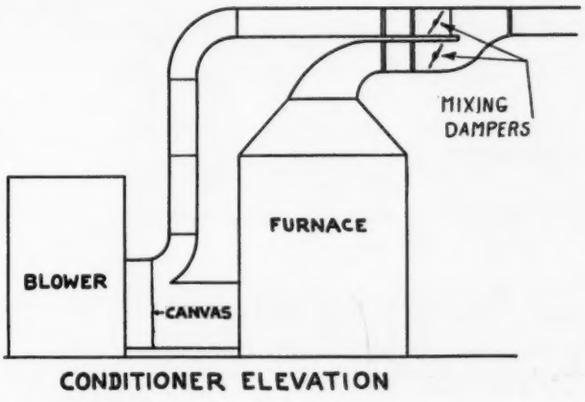
"The house is zoned both for exposure and usage—each requirement being considered of equal importance in designing this system. Fans and drives as well as all ducts and outlets are designed for a full 20-degrees of cooling."

The basement floor plan and the equipment photographs show the arrangement of apparatus and the zone mains with branches. Briefly, zone No. 1 serves the basement recreation room (pop up pipe off the main near the bonnet), basement toilet, laundry and storage room from a thermostat in the recreation room. Zone No. 2 serves the south side of the house—first floor—kitchen, maid's room, maid's bath, dining room (two registers) and the

Front of furnace showing zone damper motors and duct work.



Exterior of house with garage at street level.



CONDITIONER ELEVATION

Detail of warm air and return air mixing chamber with dampers which control air proportions and return air by-pass.

◆

workshop in the basement from a thermostat in the library.

Zone 3 is a really tricky affair. Near the stairs the main splits two ways at right angles—one section runs to the back of the house to supply registers in breakfast room (2 registers) and powder room. The other section runs to the front of the house and supplies two registers in the living room; one small square pipe runs between joists to a register in the bay window; one register in the vestibule; and one small branch circles the stairs to reach the register for the stair hall. The thermostat is in the living room.

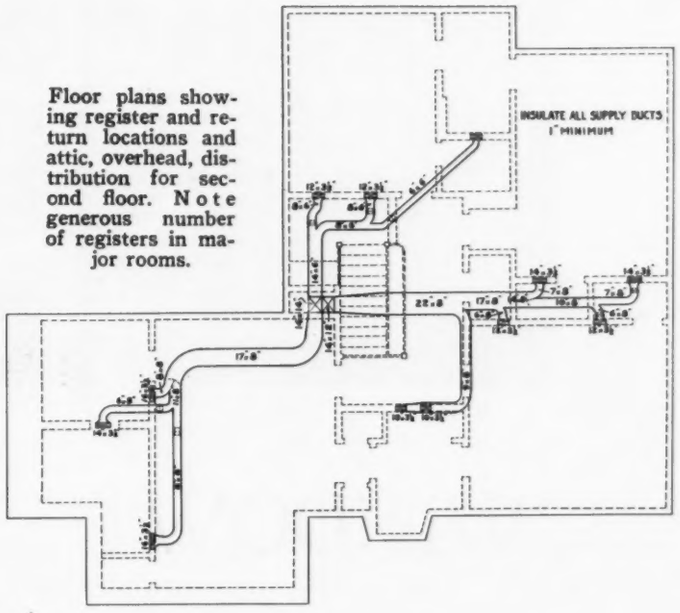
Zones 4 and 5 end at risers which pass up through large wall spaces to the attic. Zone 4 serves resisters in the upstairs hall, two bed rooms and one bath from a thermostat in the front bed room. Zone 5 serves registers in the master bed room, the back bed room, twin bath, master bath, master dressing room from the thermostat in the master bed room.

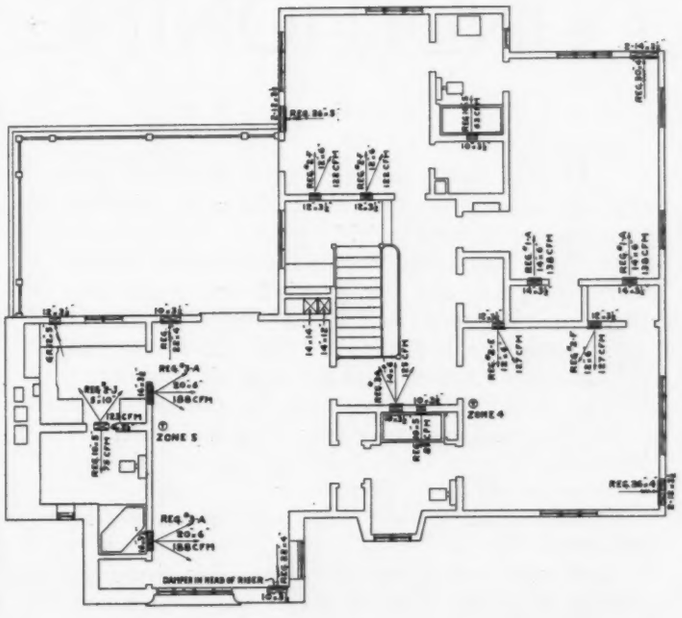
In this house cost was not a matter of shaving off the last dollar, and from this came two interesting features. First all bed rooms have two registers of generous size; on the first floor the living room has three registers, the dining room two, the breakfast room two, the other minor rooms one register. Second, critical registers and returns have two stacks for each face with wide, narrow grilles; and all registers have directional vanes to control air flow. All pipe in the attic is heavily insulated.

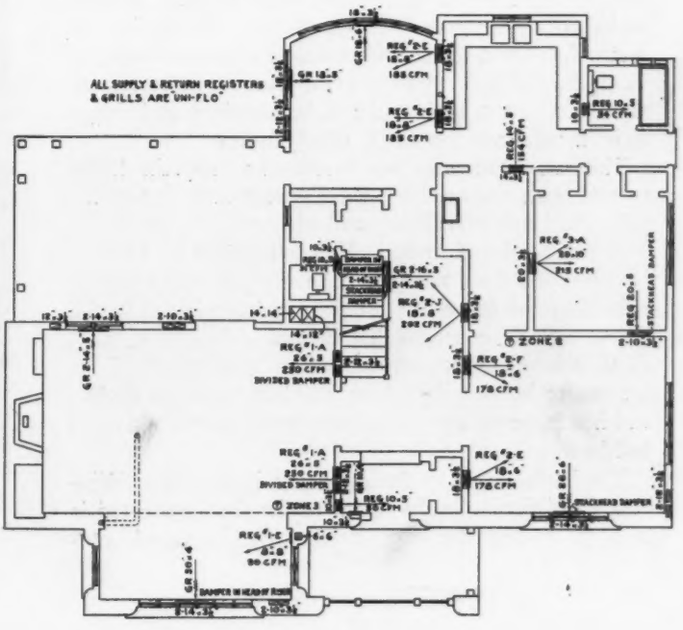
The duct construction whereby untempered air from the returns is mixed with warm air from the bonnet is shown in one of the details and in the photographs. The dampers which control the mixture with the arms to the operating motors show clearly in the photograph. Also the casing from the two furnaces which have a total output of 300,000 Btu per hour and the large blower housing (3,678 cfm).

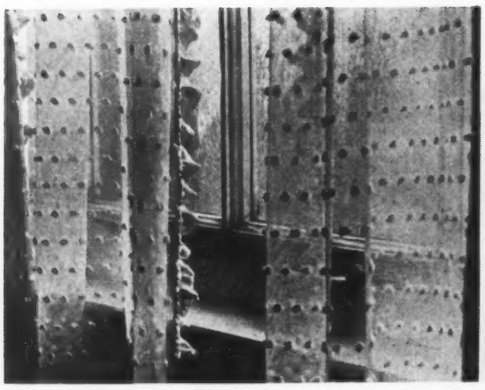
When the data for this description was secured, the house was not entirely completed. Provision for cooling coils in the return to the blower was made, but a compressor for direct expansion was not installed.

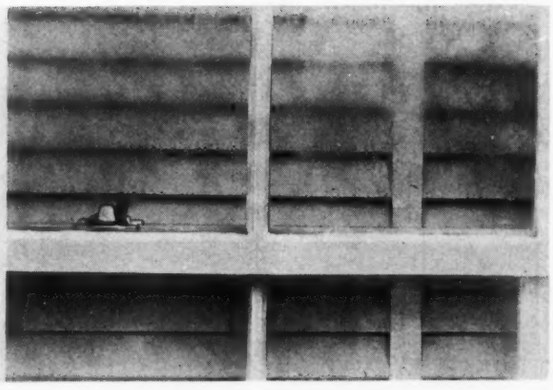
Floor plans showing register and return locations and attic, overhead, distribution for second floor. Note generous number of registers in major rooms.











WINDOW CONDITIONING

This industry can give home owners greater comfort if—we provide means for carrying higher relative humidities indoors and—make room areas near windows as warm as areas along inside walls. One method is "window conditioning," a phrase being popularized today in national advertising.

•

FOR many years one of our stock questions has been—"Will the windows on the north, east and west sides have storm sash?"

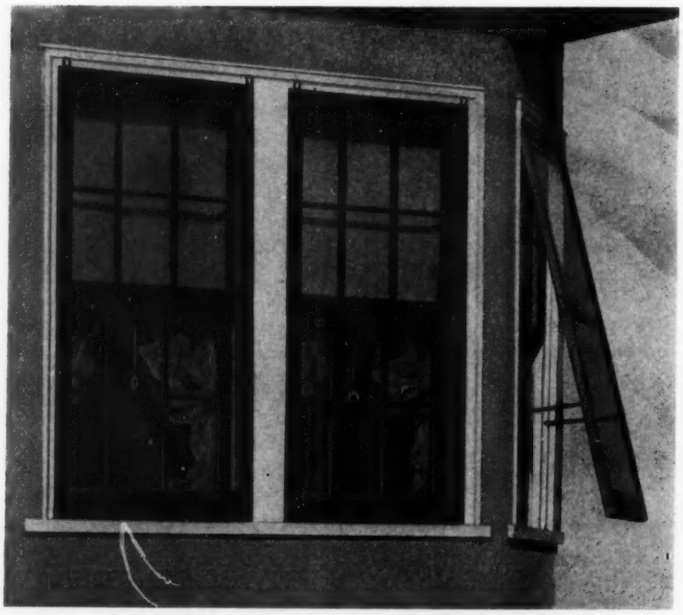
We have been asking this question because our research program and our practical experience have taught us that storm sash assure definite advantages. Storm sash, we know, reduce the direct heat loss through glass surfaces, raise the room air temperature on the inside of the glass, raise the temperature at which condensation occurs permitting higher relative humidities indoors, reduce infiltration, and through combinations of these effects insure more uniform indoor temperatures at lower fuel costs with smaller sizes of heaters.

Most home owners, through personal experience and reading, appreciate these advantages, but through carelessness assume that almost any type of sash, applied haphazardly, bring the desired results. While this industry has for a long time preached that sash must be air tight, and well fitted, a great many contractors assume that storm sash will not be air tight and figure their installations for single glass surfaces.

This fall a campaign was launched to acquaint home owners with the need for more storm sash, better fitted. National advertising and elaborate literature has been prepared and mailed. First suggested by Libbey-Owens-Ford glass company, the campaign has gained momentum as other interested firms have joined in the effort. Such concerns as Fourco Glass Company, F. C. Russell Company, and others have prepared literature to be distributed by building material dealers and heating contractors to home owners, architects and builders.

The basic slogan of the campaign is the term "Window Conditioning"; the intent of the data presented is to show owners the fuel savings, the increased comfort, the higher relative humidity which can be obtained when glass areas are "conditioned." Coupled with these monetary and comfort possibilities is better appearance. Present day storm sash can be made to harmonize with exterior appearance. Where hung or buttoned sash are used, the new windows are unobtrusive in appearance. Also, the newer forms of sash (prefabricated, patented types) are available as an extra, insulating pane which is a part of the window. All types today are easy to apply, easy to clean and readily provide for ventilation. Some forms remain in place the year 'round.

That "window conditioning" can be sold from ac-



Storm sash can be good looking and (above) will prevent condensation of moisture as shown above. (Photos by Libbey-Owens-Ford Glass Co.)

TABLE 1—RECORD OF HEAT LOSS TESTS—NINE TYPES OF CONSTRUCTION

	1—Ordinary house construction without weatherstripping, storm sash, storm doors or insulation.	2—Construction improved by adding half-inch insulation on upper ceiling.	3—Four-inch insulation on upper ceiling.	4—Half-inch insulation on ceiling and walls.	5—Weatherstripping only on all windows and doors.	6—Four-inch insulation on ceiling and walls.	7—Storm sash and storm doors all around.	8—Half-inch insulation on ceiling and walls, plus storm sash and storm doors.	9—Four-inch insulation on ceiling and walls, plus storm sash and storm doors.
	1	2	3	4	5	6	7	8	9
Total Heat Loss	159,175	153,871	149,524	139,974	125,741	118,773	110,383	91,182	69,981
Per Cent Saving	.....	3.34	6.07	12.1	21.0	25.4	30.8	42.7	55.9
Sq. Ft. H. W. Radiation	1060	1025	995	932	837	791	735	608	466
Oil Per Season, Gals	3980	3847	3738	3499	3143	2969	2759	2279	1750
Cost of Oil Per Season	$286.00	$277.00	$269.00	$252.00	$226.00	$214.00	$198.00	$164.00	$126.00
Saving in Fuel	.....	$ 9.00	$ 17.00	$ 34.00	$ 60.00	$ 72.00	$ 88.00	$122.00	$160.00
Cost of Construction	.....	$ 51.00	$102.00	$142.00	$129.00	$284.00	$106.00	$248.00	$390.00
Interest and Depreciation on Investment	.....	$ 3.57	$ 7.14	$ 9.94	$ 9.03	$ 19.88	$ 10.60	$ 20.54	$ 30.48
Net Saving	.....	$ 5.43	$ 9.86	$ 24.06	$ 50.97	$ 52.12	$ 77.40	$101.46	$129.52
Per Cent Return on Investment, Net	.....	10.6	9.65	16.9	39.5	18.3	73.0	41.0	33.4
Years for Net Fuel Saving to Pay Off Investment	.....	9.4	10.3	5.9	2.53	5.45	1.37	2.45	3.01
Cost of Heating Plant	$1590	$1537	$1492	$ 1398	$1256	$1186	$1102	$912	$699
Reduction in Plant Cost	.....	$ 53	$ 98	$192	$334	$404	$488	$678	$891

The NINE numbered columns in the above table represent different combinations of insulation. The house to which these calculations were applied is two stories high, with unfinished attic space. It contains eight rooms and bath above the basement and is of frame and shingle construction with a concrete foundation.

tual research data is plainly pointed out in this campaign. For instance, fuel savings. Tests by Professor G. L. Larson of the University of Winconsin show that storm sash or double glazing saves more fuel than any other single form of insulation, providing fuel savings of 20 to 30 per cent. And, when storm sash are used with attic floor insulation or attic floor plus outside wall insulation, savings mount to as high as 55 per cent. Results in dollars and cents in fuel saving are shown in Table I prepared by Professor Larson.

Another effective table showing fuel savings is Table 2 which lists the savings in typical cities in terms of fuel saved per square foot of glass surface for an average heating season when windows are double glazed. It is assumed in all these tests that storm sash or double glazing is tightly fitted. If air leakage around single glass windows is sufficient to place an extra load on the furnace, storm sash will reduce infiltration and show a saving—in addition to checking the heat loss by conduction through the glass. If, however, windows are tight or weather stripped, less infiltration loss will be saved by storm cash. Of course, weather stripping is not a substitute for storm sash. Weather stripping can and will reduce infiltration, but only double glazing or storm sash will reduce conduction loss.

Another important advantage of storm sash is that sash permit carrying higher relative humidities—in

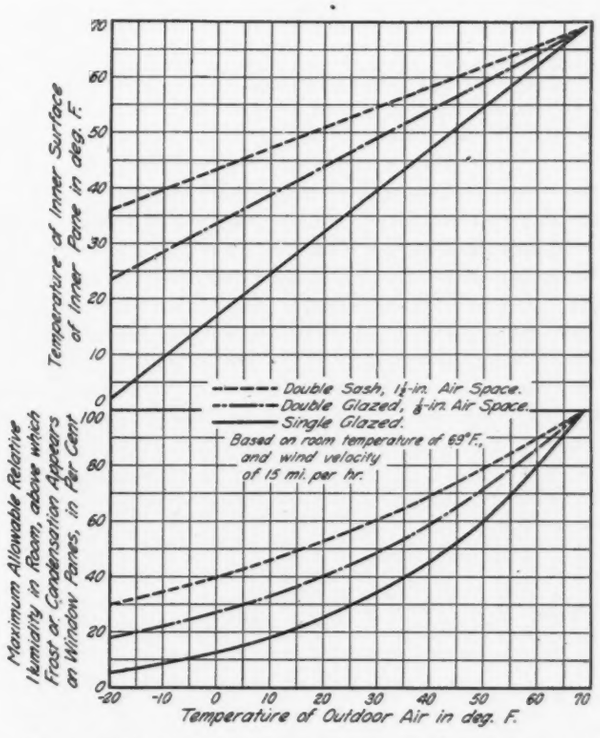

Temperature of Inner Surface of Inner Pane in deg. F.
Maximum Allowable Relative Humidity in Room, above which Frost or Condensation Appears on Window Panes, in Per Cent
Double Sash, 1½-in. Air Space.
Double Glazed, ⅛-in. Air Space.
Single Glazed.
Based on room temperature of 69°F., and wind velocity of 15 mi. per hr.
Temperature of Outdoor Air in deg. F.

Fig. 1—University of Illinois chart showing per cent of relative humidity which can be carried without condensation for three types of windows.

TABLE 2—HOW MUCH FUEL WINDOW CONDITIONING SAVES

These figures show the fuel savings possible with Window Conditioning (double-glass insulation).

To calculate savings for any given locality, multiply the total number of square feet of double-glazed window area by the figures (coal, oil or gas) given in the table for the town nearest the locality being figured. The result will be the total amount of *fuel saved* in a typical heating season by Window Conditioning.

Figures show the amount of fuel saved *for each square foot* of window area insulated with double-glass under average conditions.*

City	Oil in gallons	Coal in pounds	Mfgd. Gas** per 1000 cu. ft.
Baltimore, Md.	.77-1.26	10.0-16.2	.17-.28
Boston, Mass.	1.04-1.69	13.3-21.8	.23-.38
Buffalo, N. Y.....	1.24-2.02	15.8-25.8	.27-.45
Chicago, Ill.	1.12-1.82	14.3-23.4	.25-.41
Cincinnati, Ohio	.90-1.46	11.5-18.8	.20-.33
Denver, Colo.	1.03-1.68	13.2-21.5	.23-.38
Des Moines, Iowa...	1.14-1.86	14.6-23.8	.25-.42
Helena, Montana ...	1.43-2.34	18.4-30.0	.32-.53
Indianapolis, Ind. ...	.96-1.57	12.3-20.1	.21-.35
Kansas City, Mo.....	.87-1.42	11.2-18.3	.19-.32
Louisville, Ky.	.79-1.29	10.0-16.5	.17-.29
Milwaukee, Wis. ...	1.25-2.02	15.7-26.1	.27-.46
Minneapolis, Minn. ..	1.42-2.31	18.1-29.6	.31-.52
New York, N. Y....	.92-1.51	11.9-19.4	.20-.34
Oklahoma City, Okla.	.54- .95	7.5-12.2	.13-.21
Omaha, Neb.	1.09-1.76	13.9-22.6	.24-.40
Philadelphia, Pa. ...	.82-1.34	10.5-17.1	.18-.30
Pittsburgh, Pa.	.97-1.59	12.5-20.4	.21-.36
Portland, Maine	1.26-2.04	16.1-26.2	.28-.46
Spokane, Wash.	1.13-1.85	14.5-23.8	.25-.42
St. Louis, Mo.	.83-1.36	10.7-17.4	.18-.31

**Use the smaller figure if your windows are weather stripped or tightly fitted. Use the larger figure if you are applying storm windows over loosely fitted sash or installing modern double-glazed, weather-stripped casements. If you are building a new home with improved type sash use the larger figure. Still higher savings are possible under more severe weather conditions.*

***For natural gas divide by two.*

other words, condensation will not occur until outside temperatures reach near-zero. From the University of Illinois comes Fig. 1 which shows the maximum allowable relative humidity, above which condensation will occur at varying outside temperatures for single glass, storm sash (1⅛-inch air space) and double glazing (⅛-inch air space). Fig. 1 shows that on a typical winter day (20 degrees above zero) condensation appears at 25 per cent relative humidity with single glass; at 40 per cent with double glazing; at 52 per cent for storm sash. In other words, the popular 40 per cent relative humidity can be carried at zero when tightly fitted storm sash are used; at only 20 degrees above zero with double glazing; at only 35 degrees above zero with single glass.

That increased comfort is obtained from double glazing or use of storm sash which raises the temperature of the air adjacent to the glass surfaces is indicated from Fig. 2, also from the University of Illinois, and on which are plotted actual air temperatures outside and next to the glass inside, with and without storm sash. States the University: "With an outdoor

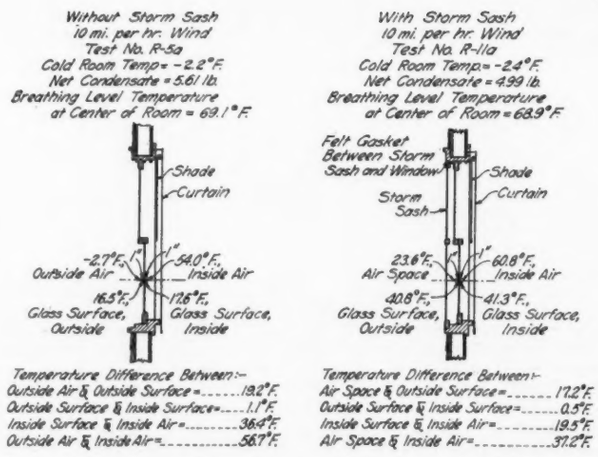
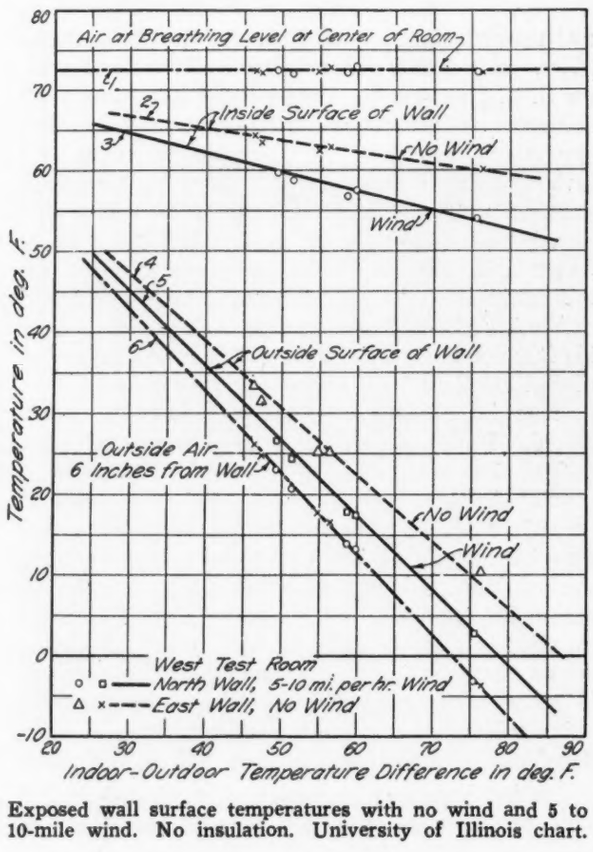

Without Storm Sash
10 mi. per hr. Wind
Test No. R-5a
Cold Room Temp.= -2.2°F.
Net Condensate = 5.61 lb.
Breathing Level Temperature at Center of Room = 69.1°F.
Shade
Curtain
-2.7°F., Outside Air
1"
54.0°F., Inside Air
16.5°F., Glass Surface, Outside
17.6°F., Glass Surface, Inside
Temperature Difference Between:-
Outside Air & Outside Surface = 19.2°F.
Outside Surface & Inside Surface = 1.1°F.
Inside Surface & Inside Air = 36.4°F.
Outside Air & Inside Air = 56.7°F.
With Storm Sash
10 mi. per hr. Wind
Test No. R-11a
Cold Room Temp.= -2.4°F.
Net Condensate = 4.99 lb.
Breathing Level Temperature at Center of Room = 68.9°F.
Felt Gasket Between Storm Sash and Window
Storm Sash
Shade
Curtain
23.6°F., Air Space
1"
60.8°F., Inside Air
40.8°F., Glass Surface, Outside
41.3°F., Glass Surface, Inside
Temperature Difference Between:-
Air Space & Outside Surface = 17.2°F.
Outside Surface & Inside Surface = 0.5°F.
Inside Surface & Inside Air = 19.5°F.
Air Space & Inside Air = 37.2°F.

Fig. 2—Glass surface temperatures for single glass and storm-sashed windows on a —2.2° F. winter day. Chart from University of Illinois bulletin.

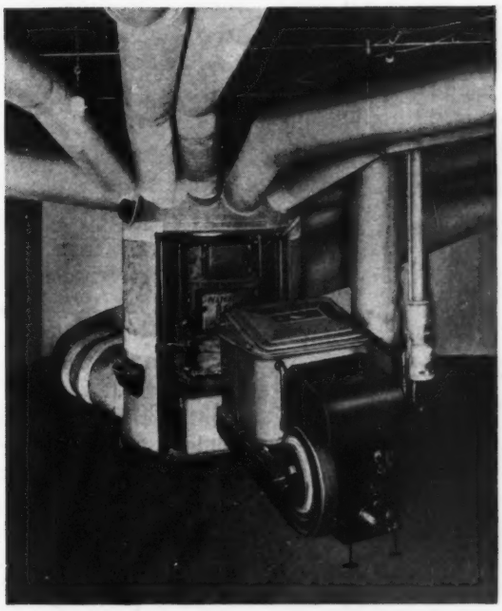
temperature of 2.7 degrees F. below zero the temperature of the inside surface of the glass in the window without storm sash was 17.6 degrees. The temperature of the inside surface of the inside pane of glass in the window with storm sash was 41.3 degrees. Hence, it is evident that a few windows may be more detrimental to comfort than considerable areas of exposed wall and that the addition of storm sash may materially increase the comfort in a room having a number of windows."

In this connection, the effect of cold wall surfaces (not glass) with respect to owner comfort, over and above fuel savings, is of some interest. Fig. 3 is a

(*Continued on page 68*)



Exposed wall surface temperatures with no wind and 5 to 10-mile wind. No insulation. University of Illinois chart.



By L. C. Price
Research Associate Professor
College of Engineering
University of Arkansas

Stoker Performance In Residence Heating* [Part 2]

House Temperature Regulation

As already noted, no continuous records of indoor temperature were kept during the period of hand-firing. We shall, therefore, have to refer to previously-published data on the subject by other authors.

Messrs. R. A. Sherman and R. C. Cross, of the Battelle Memorial Institute at Columbus, Ohio, presented a paper at the 1937 Annual Meeting of the American Society of Heating and Ventilating Engineers entitled, "Heat Losses and Efficiencies of Fuels in Residential Heating," in which they showed temperature records from houses fired both by hand and with a stoker, the hand-fired cases being both with and without thermostatic regulation. Comparison of these with our own records is interesting.

With hand firing and manual temperature control, the house temperature chart shown by these two authors fell from 80 degrees at 9:30 a. m. to 72 at noon, rose to 78, fell to 72, rose to 83, fell to 76, and rose again to 83 at 8:30 p. m. We do not know anything about the regulation of the dampers during that period but, presumably, it was at a time of day when constant temperature was desired. The maximum variation during that time was 11 degrees.

The same authors do not show any temperature record for hand firing and thermostatic control of a warm-air furnace. They do, however, show one for a steam system hand-fired, with a combination of room thermostat and a high-limit control operated by changes in the boiler pressure. According to this chart, the temperature rose from 70 degrees at about 9:00 a. m. to 74 at noon, and then remained very close to 74 from noon until about 11:30 p. m. The total amount of variation from noon to 11:30 p. m. was about 2 degrees.

A 24-hour record of house temperature with our stoker installation is shown in Figure 4. This record was made on March 26-27, 1937, and is typical of those which were obtained when the stoker re-

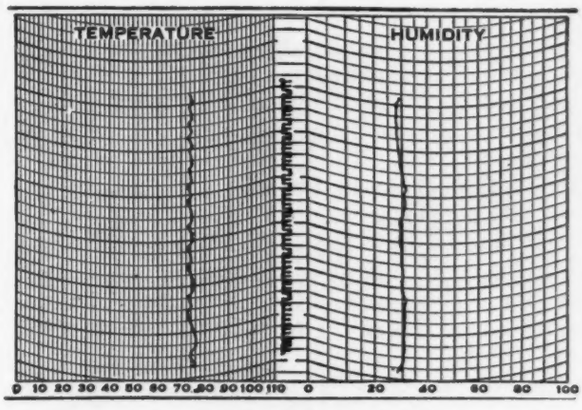


Figure 4.

Reprint of Bulletin No. 14, of same title, Engineering Experiment Station, University of Arkansas.

ceived proper care and adjustment and when the thermostat setting was not disturbed. The rise in temperature to 76 degrees at about 11:00 a. m. occurred just after cleaning the fire and stirring up the bed of hot coals. Thereafter, the thermostat seems to have held the temperature to a variation of about two degrees.

The line between the temperature and humidity records shows the frequency and duration of the operations of the stoker. When the stoker was operating, the pen of the recorder moved to the right. The humps on the right-hand side were made when operation was caused by the thermostat. The short lines on the right, indicating very short runs, were made by the hold-fire control.

Hold-Fire Control

The function of this control, as already explained, was to run the stoker occasionally when the thermostat did not call for heat, in order to keep the fire alive in mild weather. This control had to be adjusted for each different kind of coal so as to have the least possible overheating in mild weather. In general, short and frequent periods of operation were preferable to long and infrequent ones.

Sometimes it proved impossible to maintain a fire without overheating on warm days. This is illustrated by Figure 5 which is a record of both indoor and outdoor temperatures for the week of March 6-13, 1937. The thermostat was set at 70 degrees throughout that week. Overheating was especially noticeable on Wednesday, Thursday, and Friday afternoons. The outdoor temperature was 50 or below at night, which required some heat, but rose to 70 or more in the afternoons. The cool nights caused the stoker to build up a fairly thick fire. The hold-fire control was adjusted so that it barely kept the fire alive during the day, but overheating in the afternoons could not be avoided, and the indoor temperature reached 82 on Thursday afternoon when the temperature outdoors was 75.

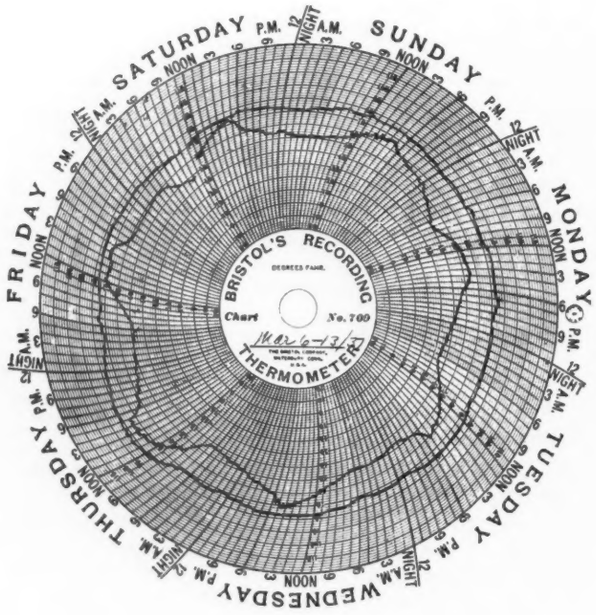


Figure 5.

Humidity

The relative humidity in the house really had nothing to do with the operation of the stoker, but was observed as a matter of course, and changes were made in the humidifier in efforts to increase its effectiveness. These changes have been described in the section on "Test Procedure." The humidity record shown in Figure 4 was made at a time when the humidifier was out of order. With a shallow water pan 8 inches wide and 36 inches long, containing numerous wicks to absorb the water and present a large evaporating surface, the humidity was usually between 35 and 45 per cent in severe weather. It always increased at mealtime, due partly to water of combustion from the gas burned in the cook stove, and partly to evaporation from the cooking. The humidifier as originally purchased was totally inadequate; the larger pan and the wick arrangement were necessary before the house humidity could be appreciably raised.

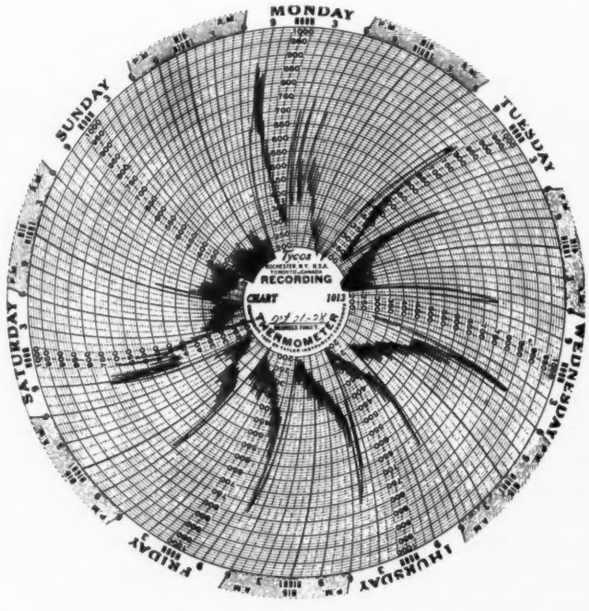


Figure 6.

Stack Temperature and Stack Gas Analysis

A typical record of stack temperature is shown in Figure 6, being for the week of October 21-28, 1936. The peak temperatures were, of course, attained during the longer operations of the stoker. The highest stack temperature ever recorded was 950 degrees on the morning of Friday, April 16, 1937, just after the thermostat was turned up for daytime operation, and when using the Nut-Slack coal.

Analyses of the flue gas were made several times during both seasons of stoker operation. One of

these, while burning slack coal, gave the following results: For the "off" period, 7.6% CO_2, 11.6% Oxygen, and no CO. For the "on" period, 8.8% CO_2 10.3% Oxygen, and no CO. In more severe weather, the CO_2 content was higher and the oxygen correspondingly lower. In all cases, the adjustment of coal feed and air supply was determined more by the height of fire and its proper control than by attempts to get maximum CO_2 in the flue gas.

Attention Required by the Fires

No record was kept of the number of daily visits to the furnace when firing by hand. Messrs. Sherman and Cross, in the paper referred to previously, kept such records on several hand-fired furnaces, and found that the number of daily visits generally varied from 4 to 6, "charging fuel, shaking grate, or stirring up the fuel bed."

In the case of our stoker, the required attendance varied according to the kind of coal used. During the two seasons, Henryette Nut was burned for a total of 178 days, and required 182 visits to the furnace, or an average of 1.022 visits per day. Nut Slack was burned during the 1936-37 season for a total of 150 days and required 203 visits, an average of 1.353 visits per day. Slack was used during both seasons for a total of 66 days, requiring 67 visits, an average of 1.015 visits per day, or practically the same as the Henryetta Nut. The greatest number of visits required in any one day was 4, on January 6, 1937. On three occasions, three visits per day were required,—November 3, 1936, March 17, 1937, and March 26, 1937. Nut Slack was being used at all these times.

It is hard to see why Nut Slack should have required more attention than straight Slack coal. This may have been at least partly because the dealer put water on the coal to keep the dust down and it was very wet when received. As a result, it would cling to the sides of the hopper, and fail to feed. It had then to be punched down onto the feed screw or else the fire would go out for want of fuel. The coal remained wet and sticky for about a month after it was received, and required more frequent attention during that time.

Accumulation of fly ash in the smoke pipe and furnace passages was worse with the stoker than with hand firing. This was, of course, due to the very light, feathery ash from certain coals, and to the blowing of the stoker. This ash had to be removed once during the 1935-36 season, and twice during that of 1936-137.

Coal Feed and Air Supply

As already pointed out, the stoker manufacturer's recommendations as to coal size were often disregarded; sometimes of necessity, because the recommended grade of coal was not available; and sometimes by design, because it seemed desirable to see how the stoker would perform with non-recommended sizes.

With all sizes of coal, it was necessary to change the relation of coal feed and air supply occasionally to suit the weather. A thick fire was desirable in severe weather for best efficiency and proper heating of the house. A much thinner fire was necessary in mild weather to avoid undue overheating.

Nut coal of the recommended size seldom required changes in the stoker adjustment. Slack coal and the Nut-Slack did, however, require considerable vigilance to keep the fire at the proper height. The balance between coal feed and air supply was then quite delicate, and any unbalance would accumulate in a few hours to the point where the fire would go out from either lack of fuel or too much of it. Fine coal, of course, offered greater resistance to the passage of air, so that its use required a thinner fire than did the larger sizes. A sortage of fuel would, therefore, be felt more quickly. An excess of fuel, even if small, would increase the thickness of the fire, which would, in turn, reduce the air supply because of increasing resistance. This would cause the fire to build up still higher, resulting in more resistance, less air, and so on in a vicious circle until the coal feed would have to be cut off entirely or else the fire would be smothered. This actually happened on several occasions. After the fire was smothered, the stoker would keep on feeding coal into the furnace until the hopper was empty. Such a situation could, of course, be prevented by more frequent and careful attention. With frequent attention and intelligent adjustment of the balance between coal and air, there is no question but that the smaller and cheaper grades of coal can be used. Whether the householder prefers smaller fuel bills or greater freedom from the care of his furnace, is of course, for him to decide.

Summary and Conclusions

Use of the stoker resulted in an average saving of 14 per cent in the quantity of coal required. From Tables II and IV, we find that the four years of hand firing had an average coal consumption of 3.705 tons per thousand degree-days. During the two years of stoker firing, the average consumption was 3.19 tons per thousand degree-days, or 14 per cent less. On this basis, the consumption in a normal season of 3,593 degree-days would be 13.3 tons fired by hand or 11.4 tons fired by stoker. Moreover, the worst year of stoker firing was better than the best year of hand firing—3.30 tons per thousand degree-days against 3.44. When fuel costs are considered, we find that the most expensive year of stoker firing was cheaper than the cheapest year of hand firing—$18.97, against $19.30 per thousand degree-days, although the former includes the cost of electricity.

The cost of fuel depends greatly, of course, on the kind of coal used. Table IV shows that, if one is willing and able to give his furnace the necessary attention, he can use cheaper coal and heat his house with a stoker for $13.59 per thousand degree-days, or $48.80 for a normal season, including the cost of electricity. This compares with $19.30 per thousand degree-days for the cheapest year of hand

(*Continued on page* 88)

Precalculated Engineering

In the September issue the author presented a method, with tables, for determining chimney draft. This article discusses furnace ratings and capacities when the combustion rate is more or less than the 7.5 pounds per hour on which most furnaces are rated. The precalculated tables show ratings and capacities for gravity or mechanical circulation under hand or automatic firing.

By G. A. Voorhees

IN specifying the furnace for a given job, it is a convenience for the dealer, the engineer or the salesman who makes the estimates, to have a complete schedule of heat delivering capacities at various combustion rates, of all sizes and types of hand-fired coal burning furnaces which he uses.

Table 12 may be used as a basis for compiling such capacities for any given furnace if the gravity leader rating as determined by the National Association Rating Formula, is known. The method of using this table is shown by the following example:

Suppose a 24-inch firepot cast furnace is rated by the Association as having a gravity capacity of 597 square inches of leader area, and the corresponding capacities at the registers are wanted in Btu. per hour at 6-pound and 6.5-pound combustion rates for gravity heating and at 6-pound, 7.5-pound and 9-pound rates for mechanical circulation.

Square inches of leader area are shown in the left hand column of the table but the gravity leader capacity of this particular furnace, 597 square inches, does not appear. In such a case, break the given leader area down into elements which are listed. The area of 597 square inches can be separated into the elements:

(500 sq. ins.) + (90 sq. ins.) + (7 sq. ins.)

First, locate 500 in the left hand column of the table. In the same horizontal line to the right and in the 6-pound column for gravity heating, the Btu. equivalent is found to be 54,400. Jot this down as in the tabulation below.

Second, locate 90 square inches in the rated leader area column and again following across to the right, it is found in the 6-pound column for gravity circulation, that the corresponding Btu. capacity is 9,792. In a similar manner, find the equivalent of 7 square inches which is, for the 6-pound rate and gravity flow, 762. Tabulating and adding these values, shows that a furnace having a gravity rating of 597 square inches of leader, will deliver 64,954 Btu. per hour at the registers at a combustion rate of 6 pounds of coal per square foot of grate per hour and with natural gravity circulation.

With the same procedure for each of the other combustion rates for both gravity and mechanical circulation, the following results are obtained:

Leader rating sq. ins.	Gravity 6-lb. rate	Gravity 6.5-lb. rate	Mech. 6-lb. rate	Mech. 7.5-lb. rate	Mech. 9-lb. rate
500	54,400	58,933	78,800	98,500	118,200
90	9,792	10,608	14,184	17,730	21,276
7	762	825	1,103	1,379	1,655
Total 597	64,954	70,366	94,087	117,609	141,131

This method was used to compile the capacity table shown in Fig. 2 and after the compilation was

TABLE 12

FURNACE CAPACITIES, BTU PER HOUR AT REGISTERS						
Furnace No.	20	22	24	27	30	32
Gravity Rating Sq.Ins.	408	499	597	766	892	1200
Comb. Rate	GRAVITY CIRCULATION					
5	37.0	45.2	54.1	69.5	80.9	108.8
5½	40.7	49.8	59.6	76.4	89.0	119.7
6	44.4	54.3	65.0	83.3	97.1	130.6
6½	48.1	58.8	70.4	90.3	105.1	141.4
7	51.8	63.3	75.8	97.2	113.2	152.3
7½	55.5	67.9	81.2	104.2	121.3	163.2
8	58.0	70.9	84.9	108.9	126.8	170.6
8½	60.4	73.8	88.3	113.3	132.0	177.6
9	62.6	76.6	91.6	117.5	136.8	184.1
9½	64.7	79.1	94.6	121.4	141.4	190.2
10	66.6	81.4	97.4	125.0	145.6	195.8
	MECHANICAL CIRCULATION					
5	53.6	65.5	78.4	100.6	117.2	157.6
5½	58.9	72.1	86.2	110.7	128.9	173.4
6	64.3	78.6	94.1	120.7	140.6	189.1
6½	69.7	85.2	101.9	130.8	152.3	204.9
7	75.0	91.8	109.8	140.8	164.0	220.6
7½	80.4	98.3	117.6	150.9	175.7	236.4
8	85.7	104.9	125.5	161.0	187.4	252.2
8½	91.1	111.4	133.3	171.0	199.1	267.9
9	96.5	118.0	141.1	181.0	210.9	283.7
9½	101.8	124.5	149.0	191.1	222.6	299.4
10	107.2	131.1	156.8	201.2	234.3	315.2

Fig. 2—Precalculated table of furnace capacities in Btu per hour at the registers for gravity or mechanical circulation at 5 to 10 pounds per hour combustion rate.

TABLE 12

Rated Gravity Leader Area, Sq.Ins.	GRAVITY CIRCULATION								MECHANICAL CIRCULATION								Rated Gravity Leader Area, Sq.Ins.
	Combustion rate, pounds of coal per square foot of grate per hour								Combustion rate, pounds of coal per square foot of grate per hour								
	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	
1	91	100	109	118	127	136	142	148	153	159	163	131	145	158	171	184	197	210	223	236	250	263	1
2	181	199	218	236	254	272	284	296	307	317	326	263	289	315	342	368	394	420	447	473	499	525	2
3	272	299	326	354	381	408	427	444	460	476	490	394	433	473	512	552	591	630	670	709	749	788	3
4	363	399	435	471	508	544	569	592	614	634	653	525	578	630	683	736	788	841	893	946	998	1,051	4
5	453	499	544	589	635	680	711	740	767	792	816	657	722	788	854	919	985	1,051	1,116	1,182	1,248	1,313	5
6	544	598	653	707	762	816	853	888	921	951	979	788	867	946	1,024	1,105	1,182	1,261	1,340	1,418	1,497	1,576	6
7	635	698	762	825	889	952	995	1,036	1,074	1,109	1,142	919	1,011	1,103	1,195	1,287	1,379	1,471	1,563	1,655	1,747	1,839	7
8	725	798	870	943	1,015	1,088	1,137	1,184	1,227	1,268	1,306	1,051	1,156	1,261	1,366	1,471	1,576	1,681	1,786	1,891	1,996	2,101	8
9	816	898	979	1,061	1,142	1,224	1,280	1,332	1,381	1,426	1,469	1,182	1,300	1,418	1,534	1,655	1,775	1,891	2,009	2,128	2,246	2,364	9
10	907	997	1,088	1,179	1,269	1,360	1,422	1,480	1,534	1,585	1,632	1,313	1,448	1,576	1,707	1,839	1,970	2,101	2,233	2,364	2,495	2,627	10
20	1,813	1,995	2,176	2,357	2,539	2,720	2,843	2,959	3,068	3,170	3,264	2,627	2,889	3,152	3,415	3,677	3,940	4,203	4,465	4,728	4,991	5,253	20
30	2,720	2,992	3,264	3,536	3,808	4,080	4,265	4,439	4,602	4,755	4,896	3,940	4,334	4,728	5,122	5,516	5,910	6,304	6,698	7,092	7,486	7,880	30
40	3,627	3,989	4,352	4,715	5,077	5,440	5,687	5,919	6,136	6,339	6,528	5,253	5,779	6,304	6,829	7,355	7,880	8,405	8,931	9,456	9,981	10,507	40
50	4,533	4,987	5,440	5,893	6,347	6,800	7,108	7,398	7,670	7,924	8,160	6,567	7,223	7,880	8,537	9,193	9,850	10,507	11,163	11,820	12,477	13,133	50
60	5,440	5,984	6,528	7,072	7,616	8,160	8,530	8,878	9,205	9,509	9,792	7,880	8,668	9,456	10,244	11,032	11,820	12,608	13,396	14,184	14,972	15,760	60
70	6,347	6,981	7,616	8,251	8,885	9,520	9,952	10,358	10,739	11,094	11,424	9,193	10,113	11,032	11,951	12,871	13,790	14,709	15,629	16,548	17,467	18,387	70
80	7,253	7,979	8,704	9,429	10,155	10,880	11,373	11,837	12,273	12,679	13,056	10,507	11,557	12,608	13,659	14,709	15,760	16,811	17,861	18,912	19,963	21,013	80
90	8,160	8,976	9,792	10,608	11,424	12,240	12,795	13,317	13,807	14,264	14,688	11,820	13,002	14,184	15,336	16,548	17,730	18,912	20,094	21,276	22,458	23,640	90
100	9,067	9,973	10,880	11,787	12,693	13,600	14,217	14,797	15,341	15,849	16,320	13,133	14,447	15,760	17,073	18,387	19,700	21,013	22,327	23,640	24,953	26,267	100
200	18,133	19,947	21,760	23,573	25,387	27,200	28,433	29,593	30,682	31,697	32,640	26,267	28,893	31,520	34,147	36,773	39,400	42,027	44,653	47,280	49,907	52,533	200
300	27,200	29,920	32,640	35,360	38,080	40,800	42,650	44,390	46,022	47,546	48,960	39,400	43,340	47,280	51,220	55,160	59,100	63,040	66,980	70,920	74,860	78,800	300
400	36,267	39,893	43,520	47,147	50,773	54,400	56,867	59,187	61,363	63,394	65,280	52,533	57,787	63,040	68,293	73,547	78,800	84,053	89,307	94,560	99,813	105,067	400
500	45,333	49,867	54,400	58,933	63,467	68,000	71,083	73,984	76,704	79,243	81,600	65,667	72,233	78,800	85,367	91,933	98,500	105,067	111,633	118,200	124,767	131,333	500
600	54,400	59,840	65,280	70,720	76,160	81,600	85,300	88,780	92,045	95,092	97,920	78,800	86,680	94,560	102,440	110,320	118,200	126,080	133,960	141,840	149,720	157,600	600
700	63,467	69,813	76,160	82,507	88,853	95,200	99,517	103,578	107,386	110,940	114,240	91,933	101,127	110,320	119,513	128,707	137,900	147,093	156,287	165,480	174,673	183,867	700
800	72,533	79,787	87,040	94,293	101,547	108,800	113,733	118,374	122,726	126,789	130,560	105,067	115,573	126,080	136,587	147,093	157,600	168,107	178,613	189,120	199,627	210,133	800
900	81,600	89,760	97,920	106,080	114,240	122,400	127,950	133,171	138,067	142,637	146,880	118,200	130,020	141,840	153,660	165,480	177,300	189,120	200,940	212,760	224,580	236,400	900
1000	90,667	99,733	108,800	117,867	126,933	136,000	142,166	147,968	153,408	158,486	163,200	131,333	144,467	157,600	170,733	183,867	197,000	210,133	223,267	236,400	249,533	262,667	1000

completed, the values obtained were divided by 1,000 by moving the decimal point three places to the left. Thus, 64,954 became 64.9+ or 65.0; 70,366 became 70.4, etc. The actual values in Btu. per hour as given in Table 12, are converted in this way in Fig. 2, into capacities in *thousands* of Btu. per hour which are sufficiently accurate and are much more convenient to handle.

The error resulting from carrying capacities in thousands of Btu. per hour, to only one decimal place, cannot amount to more than 50 Btu. per hour and for a capacity as low as 50,000 Btu. per hour, this is one per cent. For a capacity of 100,000 Btu. per hour, it would be one-half of one per cent.

Limitations of 7.5 Combustion Rate

Caution: The Standard Code Gravity Rating Formula is based on a combustion rate of 7.5 pounds of coal per square foot of grate per hour and on furnace and plant efficiencies based on the results of tests at the University of Illinois. Remember in dealing with gravity heat delivery capacities at the registers that, other conditions being equal, both the furnace efficiency of 55 per cent and the register efficiency of 75 per cent, will tend to fall off to an unknown extent as combustion rates advance beyond 7.5 pounds per square foot of grate per hour.

At a 10-pound combustion rate for example, the hotter fire will produce a higher furnace temperature with a consequently greater "loss" of heat into the basement due to higher furnace casing and smoke pipe temperatures. The higher smoke temperature will mean a greater loss of sensible heat via the chimney. These and other losses, will mean that less than the assumed 55 per cent of heat of the coal fired, will be delivered to the warm air leaders at the furnace bonnet. For general operating conditions, the exact extent of the reduction of furnace efficiency below 55 per cent is not known.

With gravity circulation, the air temperature in the leaders will likewise be much higher at a 10-pound combustion rate than at 7.5 pounds. This higher duct temperature which will be true of any combustion rate above 7.5 pounds, will cause more heat to be thrown off between furnace bonnet and register and therefore the register efficiency will drop below the 75 per cent corresponding to the 7.5-pound combustion rate assumed as a basis for the Association Gravity Leader Area Ratings. The extent of this loss is also unknown.

Some of the heat "lost" in the basement and elsewhere, will be regained and will find its way to the rooms by indirect paths as has been pointed out frequently by members of the University of Illinois Research Staff in their discussions of over-all plant efficiency. Just what the *net* reduction in over-all efficiency will be at combustion rates exceeding 7.5 pounds is not definitely known or at least, there is no agreement among heating men as to the amount. The writer has no specific recommendations to offer on this point, other than to cite the practice of one engineer who frequently has occasion to lay out gravity jobs for combustion rates

in excess of the normal 7.5 pounds. He estimates that the net heat delivery at the registers will be reduced 2 per cent for *each* increase of *one-half pound* in combustion rate beyond the standard 7.5-pound rate.

In the gravity capacity section of Table 12, this reduction has been arbitrarily applied to Btu. capacities for combustion rates higher than 7.5 pounds, not with the intention of signifying that it is the correct reduction to make, but because it seems to work out reasonably well in practice and because *some* correction factors must be applied to guard against over-estimating register capacities.

The method followed in calculating Table 12 was to start with the assumption in the Gravity Rating Formula, that each square inch of rated leader capacity is equal to 136 Btu. per hour delivered at the registers for a combustion rate of 7.5 pounds of coal per square foot of grate per hour. On this basis, the column for the 7.5-pound rate (gravity) was first calculated.

For the other columns in the gravity section and at combustion rates less than 7.5-pound, the values corresponding to the leader areas shown in the left hand column, were determined by means of the formula:

$$\text{Btu. capacity} = \frac{\text{Comb. rate}}{7.5} \times (\text{Capacity at 7.5-pound rate})$$

For example, the 7.5-pound rate column shows the capacity of 8 square inches of rated leader area to be 1,088 Btu. per hour. For a rate of 5.5 pounds the corresponding capacity is:

$$\text{Btu. capacity at 5.5-lb. rate} = \frac{5.5}{7.5} \times 1{,}088$$
$$= 0.733 \times 1{,}088$$
$$= 798 \text{ Btu. per hour for 8 sq. ins. rated leader area at 5.5-pound combustion rate, gravity.}$$

For gravity circulation and combustion rates in excess of 7.5, the same formula was used and the correction of two per cent for each half pound above 7.5 was then applied. Thus, for 60 square inches of rated leader and a combustion rate of 9.5 pounds, the Btu. capacity of 60 square inches at 7.5 pounds was multiplied by the ratio 9.5/7.5 which gave:

$$\frac{9.5}{7.5} \times 8{,}160 = 10{,}336 \text{ Btu. (uncorrected capacity)}$$

This value, 10,336 Btu, would be the capacity at the register *if* the efficiency of the plant were the same at a combustion rate of 9.5 pounds as at 7.5 pounds. But assuming, as was done in the compilation of the table, that for gravity circulation, the net capacity at the registers would be reduced 2 per cent for each half pound increase in combustion rate beyond 7.5, the corrected value was obtained thus:

$$10{,}336 \times \left[1 - \left(\frac{9.5 - 7.5}{0.5} \times 0.02\right)\right] = 9{,}509 \text{ Btu.}$$

per hour for 60 sq. ins. rated leader area at 9.5-pound combustion rate, gravity.

The construction of the mechanical heating capacity section of the table was likewise based on the complete set of values for a combustion rate of 7.5 pounds and the values in the 7.5-pound column were then converted in a similar manner to corresponding capacities at other combustion rates *except* that no reduction in capacity was assumed for rates in excess of 7.5 pounds because, with forced circulation, the tendency toward reduced efficiency can be offset by increasing the volume of air circulated. It was assumed that, as explained in a previous article, the capacity at the register for mechanical circulation at a 7.5-pound combustion rate, would be 197 Btu. per square inch of *rated* gravity leader area.

Window Conditioning

(*Continued from page* 62)

chart from the University of Illinois showing inside wall surface temperatures. In explanation, the university says: "The temperatures that may exist at the inside surface of a typical exposed frame wall, consisting of lath and plaster, 3⅝ inch studding, sheathing, clapboards is shown in Fig. 3. Here, when the outdoor temperature was —8 degrees F. shown as an indoor-outdoor temperature difference of 80 degrees F., the temperature of the inside surface of the exposed wall was 60 degrees F. with no wind. With a wind having a velocity of 10 miles per hour blowing on the exposed surface, the temperature of the inside surface was only 52 degrees F.

"Under these conditions a slight modification must be made in the interpretation of the comfort chart. With three exposed walls and the room air at 72 degrees F. if the inside wall surfaces are at 52 degrees F. the air temperature must be increased to 78 degrees F. in order to obtain the same degree of comfort that would exist with both air and inside wall surfaces at 72 degrees F. Naturally the effectiveness of the wall as a heat insulator is reflected in the temperature of the inside surface. Poorly insulated walls result in low surface temperatures. The typical frame wall used in Fig. 3 had an overall heat transmission coefficient of approximately 0.26 Btu per square foot per hour per degree F. If this wall had been insulated with some type of filled insulation, so that the overall heat loss coefficient was reduced to 0.064, the inside surface temperature with a 15-mile per hour wind and with 8 degrees below zero outdoors would have been 68 degrees F. instead of 52 degrees F. In this case a room air temperature of 73 degrees F. would have produced the same degree of comfort as that obtained with both air and wall surfaces at 72 degrees F."

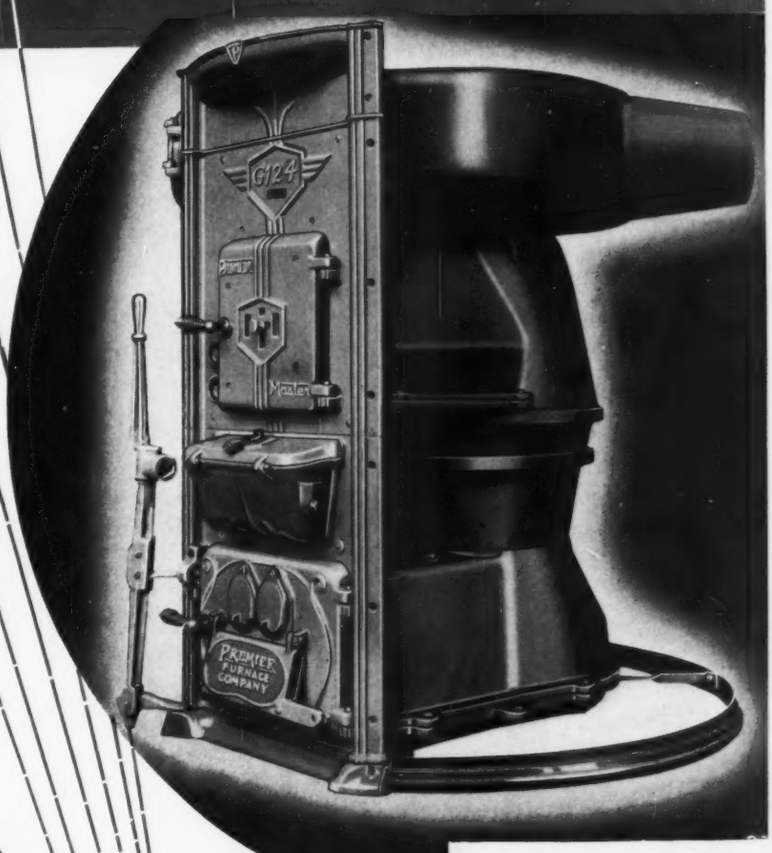
You Can't Miss with PREMIER

TODAY'S GREATEST LINE OF HOME COMFORT EQUIPMENT . . . GRAVITY FURNACES . . . BOTH CAST IRON AND STEEL . . . FOR EVERY PRICE RANGE . . . WINTER AIR CONDITIONERS . . . STOKERS . . . OIL BURNERS . . . COOLING EQUIPMENT . . . PLUS UNIQUE DEALER MERCHANDISING PROGRAM

The completeness of this great PREMIER line is amazing. Think of it . . . everything from a full range of gravity furnaces to summer cooling equipment . . . everything to make homes comfortable, winter or summer.

And what equipment! Modern, streamlined automatic winter air conditioners like the Bantam, the Zephyr and the oil or stoker fired Automatik! The Premier Oil Burner, a marvel of efficiency. A new stoker that's a sensation. The PREMIER Comfort Cooler, utilizing cold water. Room coolers and unit coolers, compressor operated.

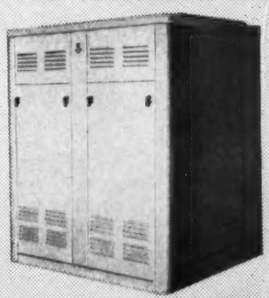
Here is a line that has literally been tailor-made to dealer demands . . . a line that's a "ten-strike" for any dealer who is out for a top score. Backed by PREMIER cooperation, by the PREMIER-F. H. A. finance plan, plus an exclusive territory arrangement, you can sell this great line in real volume, just as PREMIER dealers are doing right now. *Get the facts* today about this remarkable new set-up that will help you cash in on fall demands.



PREMIER Master *Alloy Iron* Furnace

The Master typifies the fine engineering and superior construction that goes into all the famous PREMIER gravity furnaces. Note the smooth, streamlined furnace body . . . nothing to impede air travel. The Master is cast entirely of genuine alloy iron . . . highly efficient in heat transmission . . . lastingly durable. Backed by written ten-year guarantee that *includes the grates.*

PREMIER *Zephyr* Automatic Air Conditioner with Oil Burner



Handsome, modern unit with blower, filters, humidifier, oil burner and furnace complete in a smart cabinet, finished in Gray Corduroy Baked Enamel. Delivers 111,000 B. T. U.'s at bonnet, and operating cost is surprisingly low.

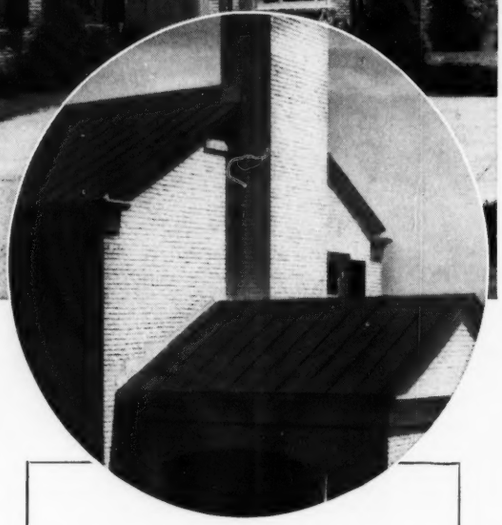
PREMIER FURNACE COMPANY, Dowagiac, Michigan

Manufacturers of Warm Air Heating and Air Conditioning Equipment

THIS FALL...

Get more metal roofing business

New residence at Lawrence Farms, exclusive Mt. Kisco, N. Y., development of Lawrence Management, Inc. Robert C. Lawrence, Designer. *Julio Palau,* Architect. *Scarsdale Roofing Co.,* Sheet Metal Contractor.



Anaconda Economy Copper . . . durable and moderately priced, meets every roofing requirement for residential use

EVERYTHING that is important in roofing . . . durability, reasonable cost, distinguished appearance, negligible upkeep expense . . . is offered by Anaconda 10-oz. *Economy* Copper Roofing. That's why it gives sheet metal artisans a fine opportunity to get profitable residential roofing business.

You have the men, the tools, the experience . . . to install this roofing. Consider its many advantages listed opposite. Do you know of any other medium-priced roofing material which combines them all? Use these advantages as selling points to *clinch* the sale.

Economy Copper Roofing is shipped promptly from Anaconda distributors located in all parts of the country. It comes to you packed flat in crates containing sufficient copper (48 sheets) for 3 squares of roof area.

If you do not have our new 65-page installation manual, write for your free copy today.

Home Owners want *Economy* Copper Roofing Here's Why:

1. APPEARANCE . . . Copper increases in beauty with age, blending perfectly with stone, brick, wood and foliage.

2. DURABILITY . . . Both here and in Europe there are countless instances of copper roofs serving generations without service.

3. COOLS FASTER . . . While other materials often hold the sun's heat 'til after midnight, copper cools rapidly as soon as the sun goes down.

4. FIRE-PROOF . . . Copper roofs eliminate the flying spark hazard, thus earning a lower insurance rate. 38125

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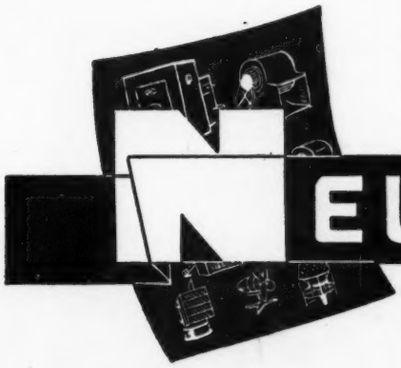


For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 98 and mail to us. Complete information will be forwarded.

● Indicates product not listed in 1938 Directory.

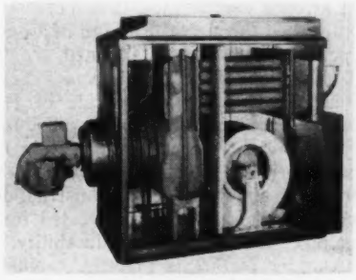
△ Indicates product and manufacturer not listed in 1938 Directory.

NEW PRODUCTS

● 212—Climatemaker Oilbilt

American Foundry and Furnace Company, Bloomington, Illinois, announces the Climatemaker Oilbilt, a complete winter air conditioning unit, built specifically and exclusively to burn oil correctly and economically. Air is heated, filter-cleaned, humidified and circulated. Temperature and humidity are under constant automatic control.

Construction is such that mechanical refrigeration may be added to provide year-around air conditioning.



The heater is built especially for use with any approved gun type oil burner. The burner projects an ignited mist of finely atomized oil into the refractory fire-brick tunnel. This oil mist burns in the presence of the hot refractory provided by the tunnel-like, moulded fire-brick combustion chamber of the unit. The Oilbilt has a horizontal firebox.

The Oilbilt heater is built entirely of cast iron. Joints are the tongue and groove type, tightly gasketed with asbestos packing, drawn and held together with bolts. One piece fits over the other, completely capping and covering the joint. The entire heater is supported on a cast iron cradle.

The 100-J Oilbilt furnace has a capacity of 115,000 btu at the register. Larger sizes of somewhat different construction are available up to 310,000 btu capacity.

◆

△ 213—Forest Fleece

J. J. Doheny Co., 326 Lake St., Belmont, Mass., announces Forest Fleece —a house insulation and sound deadening blanket.

Forest Fleece is low in cost, weighs 3 ounces per sq. ft., is fire retardent by chemical treatment, water-proof and vermin proof. It is easy and clean to apply, and unaffected by settlement or shrinkage in construction. It is composed of non-heat conducting fibres.

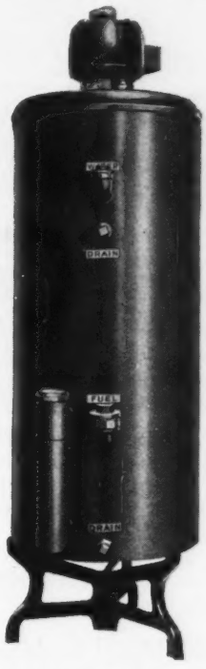
Helpful data and suggestions for selling are available to dealers.

◆

△ 214—Home Gas-Maker

Generated Gas, Inc., Mahoning Bank Bldg., Youngstown, Ohio, announces the Home Gas Maker. Using only pentane gasoline, water and air, it produces gas having approximately 1,500 Btu's per cubic foot.

In remote locations, on farms, it provides capacity for operatng the essental appliances in the home—gas range, water heater, radiant heater, laundry stove, ironing machine, etc.

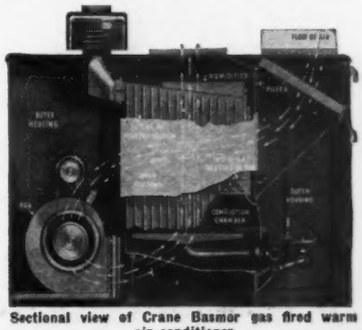


The Home Gas Maker is constructed of 14-ga. steel, all seams electrically welded. It is finished in "Hammerloid Copper" finish, with motor and stand in black, and chromium trim. Specially designed motor consumes about the current of an ordinary 60-watt bulb. Positive Magnetic Gauge indicates at all times the exact amount of fuel contained. Only 15 inches in diam., 46 inches high and weighs 88 pounds.

The Home Gas Maker is being sold thru exclusive territorial sales representatives now being selected in various states.

● 215—Gas-Fired Conditioner

Crane Co., 836 So. Michigan Avenue, Chicago., announces a new gas-fired warm air conditioner which heats, circulates, humidifies and filters air under



Sectional view of Crane Basmor gas fired warm air conditioner

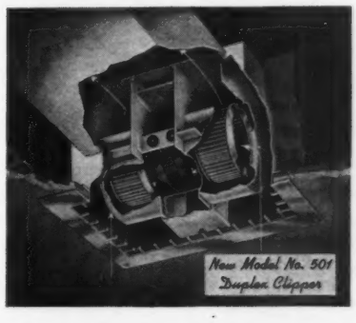
an economical system of perfected self insulation. Intake air sweeps through an outer housing of the conditioner, enveloping the inner, or heating, compartment, picking up what has, heretofore, been regarded as "lost" heat. Further economies are claimed for the air conditioner in an arrangement of fins causing what is called "staggered heat travel."

Five different sizes of air conditioner are available—from two to six sections.

◆

△ 216—Blower Ventilators

Trade-Wind Motorfans, Inc., 1325 Maple Ave., Los Angeles, California, is offering the Clipper ventilator equipped with a centrifugal blower for the kitchen, bath, game room and den, removing smoke, steam and greasy air.



The package unit is complete for electrical connection and requires only a small metal duct to carry discharge of blower out of doors.

Model 501, illustrated, is a double blower for larger kitchens. Nos. 301 and 401 are single wheel models.

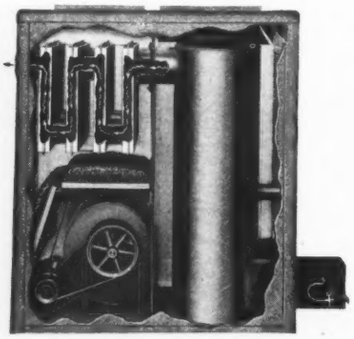
Specification and data sheet is available for the various models, with and without lights.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 98.

217—Comfortzone

Michigan Tank & Furnace Corporation, 14101 Prairie Ave., Detroit, announces the Comfortzone G-90, a modern gas-fired winter air conditioning furnace for the moderate priced home, furnishing flexibility in control of heat



to offset the changes in outdoor temperature; clean, filtered and humidified air in winter; and summer cooling by drawing cooler basement air before circulation through the home.

The down draft principle of heating is employed.

◆

218—Lock Forming Machine

The Ward Machinery Company, 564 West Washington Boulevard, Chicago, announces the new model Almar Universal lock forming machine, adaptable for Pittsburgh lock forming on one

side and with seven sets of spindles on the other side to accommodate other types of rolls for sheet metal fabrication such as standing seam, single edging, and drive cleats.

The capacity range is 18 gauge and lighter.

The machine is furnished complete with Pittsburgh Lock Rolls. The frame acts as guide for the material passing through.

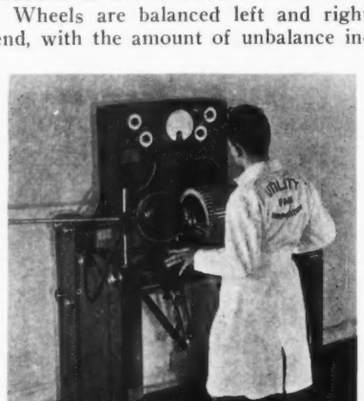
The large calibrated hand wheel mounted on top of machine takes care of the full range of specified gauges of material, and the small calibrated wheel at right hand side of machine governs the opening in the lock as to thickness of material that enters.

219—All Year Conditioners

Utility Fan Corporation, of Los Angeles, manufacturers of blowers and Dezert Koolers announces the addition of a complete line of All Year Conditioners. The All Year Conditioner is a complete unit for the converison of gravity warm air furnaces into forced air heating plants. It is equipped with Dust-Stop filters, Randall bearings and G-E motor.

All blowers sold by Utility Fan Corporation, for use in their own units or installation with other equipment, are both dynamically and statically balanced. The machine making the test is so sensitive that it detects an unbalance of 7/1000 of an ounce and vibrations of five millionths of an inch.

Wheels are balanced left and right end, with the amount of unbalance in-



dicated on the large meter. Vibrations set up are amplified 1,600,000 times, which gives an absolute check on the blower balance, and assures no vibrations at critical speeds.

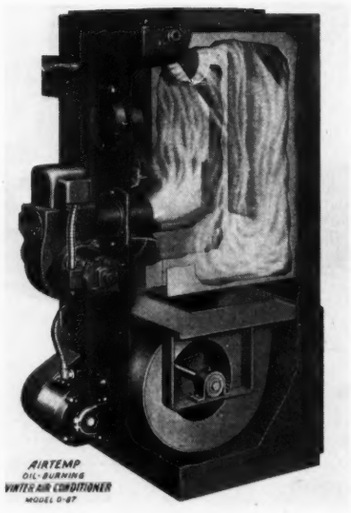
Utility blowers are completely die formed, electric welded and finished with baked enamel.

◆

220—Metal Insulation

American Flange & Manufacturing Co., Inc., 30 Rockefeller Plaza, New York City, offers Ferro-Therm metal house insulation. Ferro-Therm is a sheet steel said to reflect 95 percent of all radiated heat. In winter heat inside the building is reflected back into the building. In summer, the heat waves from the sun are reflected back from the building.

Ferro-Therm is made in sheets 24 x 32 inches and in 0.006 of an inch thickness. On account of the lightness of the metal, the sheets are crimped at 4-inch intervals for extra stiffness. Cutting and flanging the sheets is easy and installation is by carpenters.



221—Winter Air Conditioners

Airtemp, Inc., Dayton, Ohio, has just released "Line Up for Today's Business," a new sound film production to introduce a complete new line of winter air conditioners designed for low first cost, economical operation, and high efficiency.

Extreme compactness has been accomplished through the design of a new type of fire box with inclined crown sheet and angular flue connectors. Secondary radiators at each side of the fire box are connected in parallel for greater heat transfer. Material is of copper-bearing steel with main surfaces of standing seam construction and all parts triple seam welded into one piece for strength and durability.

Another feature is that the cabinets are bonderized—a protective coating on metal applied beneath the decorative lacquered finish to minimize rust. Cabinets are insulated with thick sheet asbestos surfaced with aluminum foil.

This equipment is available in both oil and gas-burning models. On the oil-burning model the stainless steel combustion chamber is suspended within the fire box to which is fitted a matched Airtemp oil burner. The gas-burning models are equipped with the new Airtemp Silent-flame gas burner. This new burner employs grid mesh strips of chrome stainless steel instead of the conventional drilled ports. The stainless steel strips are arranged to give an even blue flame across the entire burner.

The gas-burning models are available in six different sizes—in capacities of 50,000, 70,000, 100,000, 130,000, 160,000, and 200,000 Btu per hour output—designated as models G-62, G-87, G-125, G-163, G-200, G-250, tested and approved by the American Gas Association.

The oil-burning models are available in five different sizes: in capacities of 70,000, 100,000, 130,000, 160,000, 200,000 Btu per hour output—designated as models O-87, O-125, O-163, O-200, and O-250, and have been tested and approved by the Underwriters Laboratories, Inc.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 98.

△222—Rustproof Coating

Wipe-On Corporation, Industrial Division, 105 Hudson St., New York City, announces a quick drying rust-preventing inside surface covering that withstands temperatures of well over 600 deg. F. This coating is said to remain rustproof under the combined effects of heat and humidity, thus permitting the use of plain sheets for duct work.

◆

223—Conversion Burners

The Barber Gas Burner Company, Cleveland, Ohio, announces new round burner assemblies for all furnaces and boilers. These new units are built on the Barber "expansion principle," and eight models provide a sufficient range of flexibility in diameter to fit any round furnace or boiler. Adjustments are made at time of installation.

To illustrate this point, the No. 324 round burner shown here is adjustable in diameter to fit grate dimensions from 18 to 20½ in.

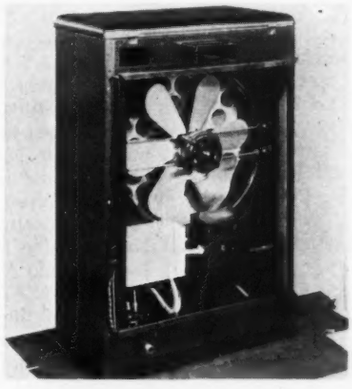
For most round boilers, burners are furnished with standard short nipples. For boilers having no clinker door, and for round furnaces, longer vertical nipples are included with the shipment. This choice of nipples enables the dealer to keep in stock assemblies which fit a wide range of both furnaces and boilers. A little trimming of the baffle plates to fit adjusted burner diameter is also necessary. Baffles are supplied to fit the maximum spread of the burner. Special span flame jets are also furnished which, when inserted, correctly adjust the position of the flame itself in the expanded burner.

Burner assemblies can now be carried in stock, along with both sizes of nipples, and the dealer is thus enabled to equip a wider range of furnaces and boilers from a smaller stock.

• 224—Circulating Gas Heater

Surface Combustion Corporation, Toledo, Ohio, announces a new circulating heater with pleasing lines and a Di-Noc finish—a process in which grained wood finishes are printed and then baked upon fine furniture steel.

The heater is equipped with an 18-in. electric fan to give positive circulation of the warm air, a gray cast iron gas burner with cast iron raised



ports, venturi type throat and a mixer suitably fitted to the burner. There is an adjustable air shutter, provided with a locking screw for regulating the primary air. There is an automatic gas valve, a main line shut off cock, a thermostat, a gas pressure regulator, a limit control, and an ionizer.

This heater is designed for low-cost housing, small basementless homes and stores or churches where a quiet, forced air, circulating heater is needed.

◆

• 225—Exhaust Fan Ventilators

Century Fan & Ventilator Company, 312 East 39th St., New York City, announces a new exhaust fan ventilator made of aluminum alloy cast in one piece, in two standard models—3-wing and 5-wing propellers, 800 to 10,500 cfm.

New P & H-Hansen 150 Ampere Vertical Arc Welder

226—Welder

The Harnischfeger Corporation of 4400 W. National Avenue, Milwaukee, announces a new machine in their line of P&H-Hansen electric arc welders—the 150 ampere vertical type welder. This new welder is a highly adaptable machine, available for a wide range of work in welding the lighter gauge metals, both ferrous and non-ferrous. With plug-in type cable receptacles for easy current reversing, and patented, single-current control, it sets a new high point in simplicity of welder operation. It is designed for high current uniformity. Furnished in the A.C. drive only, this machine is less than 4 ft. in overall height. Towing handle provides easy movement around the shop, and ample stability when raised to form a 3-point base. Proper ventilation and cooling is provided through the fresh air intake at the top, and the exhaust at the bottom.

It can also be furnished with lifting ring and without wheels where portability is not necessary.

1—Barber burner set at smallest diameter. 2—Units swung outward to required diameter. 3—Burner assembly spread to maximum size.

National

B. F. McClouth, of the Dail Steel Products Company, Lansing, Michigan, who has been serving as temporary Chairman of the Installation Codes Committee, National Warm Air Heating and Air Conditioning Association, has accepted the full Chairmanship of this important committee, following the death of the late Chairman, Professor Hoffman.

Gilbert Denges, Engineer with the Williamson Heater Company, has been appointed member of the Research Advisory Committee. Mr. Denges succeeds I. W. Rowell recently retired from the industry.

◆

National Secretaries' Conference

A meeting of the National Secretaries Conference was held on September 17 at the Waldorf Hotel, Toledo, called to order by Chairman Frank Ederle of Michigan.

In his welcome address, the chairman set forth the purpose of the Conferences, and stressed the accomplishments up to the present, especially regarding the sheet copper set-up. He discussed at length the present Federal Housing Administration set-up, and the benefits the building industry can obtain therefrom. The subject was considerably discussed by those present and all were advised to look into the matter carefully.

W. C. Markle, Secretary of the National Association of Sheet Metal Contractors was introduced and outlined the present status of that organization, what had happened during the past years, how their publication is being operated and under what conditions, also suggesting what could be done in relation to the reviving of the National association, how the Secretaries Conference could be of assistance, and what their constitution By-Laws covers regarding the classifications of the various types of work.

At the afternoon session unit heaters, Celotex and inflammable materials were the subjects inaugurated by D. A. Mannen of the Cleveland association in the absence of William Lauer of Columbus. Mr. Mannen outlined the situation in Ohio, also brought out the unit evil that has crept into Ohio, which if successful will deprive the sheet metal contractor of considerable work. It was brought out that the unit can not supplant the present method of heating for schools, etc., and Mr. Meyer of New York cited an experience in his state which would be fine ammunition for those that have to combat the same problem in other localities. Mr. Mannen related further their fight with the Ohio State authorities, advising that all should give the matter serious thought and handle and operate the matter to the best advantage of the members of the sheet metal contractor's industry. Rogers of Chicago pictured his association members' experience and what they have accomplished and are doing for the protection of those in the industry. He urged those present to familiarize themselves with the operations of the National Fire Protective Association of Boston and also the National Board of Fire Underwriters of Chicago, as these two organizations are always ready to co-operate when safety and fire hazards are under consideration.

Business conditions and labor problems were considered. The following rates of Union labor prevailed in the various localities: Buffalo, $1.30; Cleveland, $1.37½; Toledo, $1.25; Chicago, $1.70; Sandusky, $1.00; Ottawa, $1.25; Michigan State, $0.90; Detroit, $1.12½; Pittsburgh, $1.50, for non-union $0.90. (Pittsburgh is involved in a peculiar situation —ninety per cent of the help are open shop and the balance is union.) The helper situation varies in localities—some are permitted to use helpers, others are restricted. The apprentice situation seems to apply alike in all localities.

The next session program was discussed and resulted in inflammable boards, unit heaters, etc. Other subjects will be put on the program if suggestions are placed in the hands of the secretary. It was decided to have representations at our next meeting from the American Iron & Steel Institute, National Hardware and Jobbers Organization, also from the International A. F. of L.

Harry C. Knisely, Chicago, then called attention to the meeting of the Illinois Chapter of the American Institute of Architects at which air conditioning and other subjects germane to the sheet metal contractors will be up for consideration and discussion.

Harry Harte of Kansas City was unanimously approved as a member to represent that State.

The Toledo Sheet Metal and Roofing Contractors Association, Inc., were hosts at the noon-day luncheon.

Paul Biersach, Secretary.

◆

Chicago Golf Association

The Chicago Warm Air Golf Association wound up its season at Maple Crest Golf Club with the largest attendance and best party of the year.

With an ideal day for golf the scores were exceptionally good for the high handicap's while some of the par shooters ran into trouble.

Grant Wilson who has served so well as treasurer for two years won the Association Cup with a low net of 64 but was put to a hard game by Harry Ebbert, who came in with a 65.

The scores of the players were as follows:

	Score	Hdcp.	Net
E. J. Nemec	109	34	75
John H. Krehbiel	82	..	..
E. E. Olson	87	..	..
Grant Wilson	94	30	64
Harry Ebbert	80	15	65
Ralph King	77	..	..
Bob Wettstein	90	18	72
Paul Barth	87	9	78
D. C. Ellison	92	17	75
Paul Davis	83	..	..
Paul Kraft	101	30	71
Al Craver	82	..	..

The cup was presented to Grant Wilson at dinner by D. C. Ellison and Grant responded as a real champion.

The officers for the 1939 season were elected and are as follows:

President—Ed. Nemec.
Vice-President—Paul Barth.
Secretary—Ed. Carter.
Treasurer—Bob Chorley.

Plans for 1939 call for a larger playing membership and a real list of courses to play.

Association Activities . .

Indiana

The Sheet Metal, Warm Air Heating and Roofing Contractors' Association of Indiana, Inc., has arranged with Purdue University to put on an educational program at the State Convention February 3-4, 1939, according to announcement by President Louis Lehnen. President Lehnen has been in touch with Prof. W. T. Miller of Purdue and is enthusiastic over this Purdue program.

The State Association in choosing Lafayette for their 1939 meeting had in mind the possibilities of a Purdue hookup. Investigation brought out the fact that Purdue is willing to go the limit in working out an educational program in conjunction with the State Association. The present plan is, according to President Lehnen, that Purdue will take entire charge of the two-day program, with morning, afternoon and evening sessions.

Purdue University is known all over the world for the excellence of its facilities. Its equipment is of the best, and it numbers many internationally famous names in its faculty. The Indiana sheet metal trade is fortunate in having available an institution of this high type within traveling distance of all, and will not fail to take full advantage of the opportunity offered.

◆

Milwaukee

The regular monthly meeting of the Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc., was held on September 12 at the Repulican Hotel.

President Frank Kramer called the meeting to order in the presence of 24 members and visitors.

Harry McLogan was the speaker of the evening on "Workmen's Unemployment Compensation Act." Mr. McLogan read from a printed booklet, his own creation, as to how this act reflected on the employees, at the same time he analyzed the subject in such a manner that all points were brought out as to the employers' responsibility. Questions were asked and answered. Comparisons were made with what other states are doing on the subject.

Resolutions regarding Compensation Insurance were again read and a motion made by E. Arndt, seconded by Mr. Schaar, to accept the same as an amendment to be enforced in connection with new applications of membership. The motion was unanimously approved.

Chairman Geier reported the activities of the Trade Relations committee regarding the manufacturers' policy of selling their products.

Chairman Mantei submitted his report on Workmen's Compensation, citing statistics from Insurance companies, from the Wisconsin Compensation Rating & I Bureau. He stated that the Inspection Bureau will call meetings from time to time to educate and adjust their rating policies, commensurate with their records.

Nite Bank was won by Utke Sheet Metal Works. Not being present, the dollar prize will be used in connection with the one offered at the next meeting so that the October prize will be $2.00. Paul Biersach, Secretary.

◆

Chicago

At a recent meeting of the Furnace, Air Conditioning and Sheet Metal Institute the matter of a standard price list was discussed.

Chairman of the committee, Frank Harrison, called for opinions and several members gave and asked information on the subject. Those prominent in the conversation were Martin Light, Louis Drehobl, Art Meiche and Mr. Rabinowitz.

Flowers were sent to the families of Edward Repsold who died September 19, and Mr. Cotteleer, the father of Frank and Alec Cotteleer, both well-known in the Chicago sheet metal trade. It was also announced that Art Wagner of the Wagner Bros. Cornice Works is in the Swedish Covenant Hospital as a result of injuries received in an automobile accident.

"You've Got Something There"

is the quick, intelligent conclusion of prospects (as is being proven every day by leaping jumps in our sales) when our dealers show and demonstrate

The Outstanding Sales Feature Of The Industry—

STOKER-OLA'S

GEARLESS DRIVE

You can talk about such other "features" as highest quality standard-make motor . . . Minneapolis-Honeywell controls . . . highest-grade hardened-steel conveyor screw . . . handsome, large capacity, hopper . . . quality construction throughout and unlimited coal-feed control . . . but your "clincher" comes when you show them that

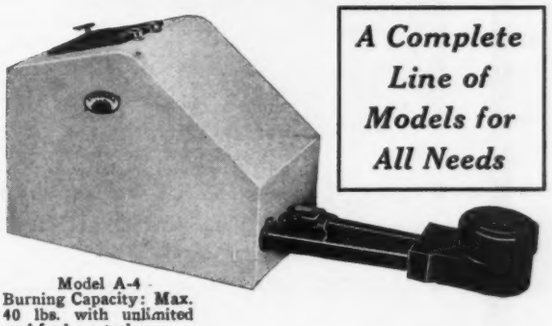
"No Gears Mean More Years"

—and prospects believe their eyes and ears.

And here's another fact: Our 40-lb. Model A-4 STOKER-OLA will meet about 95% of your installation requirements—no need to carry "a whole flock" of models in stock—and it has all these other selling features:

- More Power,
- Less Current Needed,
- Only 2 Major Working Parts,
- Unlimited Coal Feed Settings,
- No Oil Changing,
- No Oil Leaks,
- No Gear Case,
- Costs Less to Maintain,
- Built to Last Longer,
- Quality Throughout,
- Proof: 3-Year Guarantee.

We Repeat: STOKER-OLA Is America's Greatest Stoker Value!



A Complete Line of Models for All Needs

Model A-4
Burning Capacity: Max. 40 lbs. with unlimited coal-feed control.

ADVANCE APPLIANCE CO., Inc.
808 S. Washington Street Peoria, Illinois

Gentlemen: Please send full details of your dealer proposition. (Sign below—or clip to your letterhead.)

.....

.....

Association Activities

New York City

The Roofing and Sheet Metal Crafts Institute has set its goal on attaining the following three purposes:

1. Education of the contractor as to what each job costs him so as to eliminate price cutting and chiseling.
2. Education of the public to deal with "Approved Institute Members."
3. Cheaper fire and workmen's compensation insurance.

These purposes can be attained by:

1. Asking distributors, contractors and manufacturers to give us the cost of materials and labor on imaginary or given jobs and then issuing bulletins showng what the average cost per job was.
2. (a) Adopting an "Institute" decalcomania to be exhibited by our members at their places of business, having on it an insignia and the words "Approved Member, Roofing & Sheet Metal Crafts Institute, Inc.," and adopting a cut to be used by members on their letterheads and bills or invoices.
   (b) Advertising, when we can afford it, to educate the public to deal with our members and prefer them as reliable contractors.
3. Working with the State Insurance Fund to reduce the premium cost to our Institute Members.
4. While as an Institute, we will not interfere with the labor question, we will help the members interested in employer-employee relationship to organize small units for the purpose of dealing with the problem themselves. The Executive Secretary and Counsel will be ready to sit in on labor conferences, as a friend for the giving of advice and guidance.
5. Establishing a closer and more friendly relationship between members by using the Association headquarters as a place where members could drop in and meet at any time and any day.
6. Setting up an arbitration committee of contractors from among the members to settle differences between members.

The help of every contractor and every distributor interested in the Institute is invited to write to people eligible for membership asking them to join.

Hon. Irving M. Ives, Chairman of the State of New York, Joint Legislative Committee on Industrial and Labor Relations, asks co-operation and a detailed account of any industrial-labor relations (favorable or otherwise).

Irving Payson Zinbarg, Executive Secretary.

Wisconsin

A meeting of the Board of Directors and a district meeting of the Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc., of Wisconsin, was held at Racine, Wisconsin, on September 10, called to order by President R. H. Gehrke.

Mr. Fettig, chairman of the Legislative committee reported that they were making progress so that a complete report on licensing and codes can be made at the February convention. Schaar and Kramer argued for such a code. Hilcher of Racine stated that he approved, that Racine had a code on heating which was somewhat of a protection.

Chairman Kramer of the Membership Committee asked those present to make a drive for additional members.

Committeeman Schaar reported that it had been impossible to make the state tour in behalf of members and education.

Secretaries' Conference Secretary Biersach reported on the accomplishments of that body and brought to the attention of those present the status of the old National Association, requesting that discussions should be entered into as to whether the Secretaries' Conference should consolidate with them or vice versa. Member Fettig made a motion, seconded by Schaar, that Wisconsin was fully satisfied with the work that the Secretaries have accomplished and were confident that other good results would be obtained through their efforts and that the association continue on those lines unless it seemed advisable and profitable in the future to form a National Association for the Industry.

The secretary stated that the activities of the Convention Committee for advertisers in the year book will begin and that exhibits would be solicited for space.

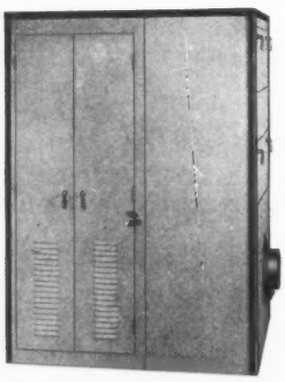
The Racine members provided a sumptous lunch and refreshments, even the celebrated Hielscher coffee.

Paul L. Biersach, Secretary.

A COMPLETE LINE

FROM ONE RELIABLE MANUFACTURER

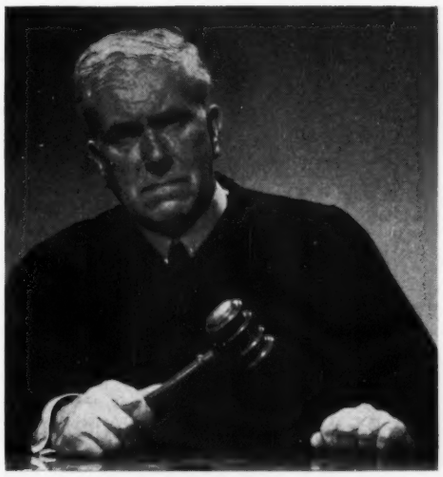
gives any dealer the best opportunity for increased sales and profits. Undivided responsibility for the complete job, makes better satisfied customers.



- HESS CLIMATE MASTER
  as illustrated, includes a welded steel inner body or heat transfer unit, blower and filters, HESS Automatic Oil Burner and controls.
- HESS AUTOMATIC STOKER FURNACE
  includes the HESS welded steel furnace in combination with the HESS Automatic Coal Stoker.
- HESS WELDED STEEL FURNACES
  are for any fuel and include many quality features for better performance and economy.
- ALSO, the HESS line includes the HESS Air Conditioning Furnace, the HESS Blower Filter Furnace, and the Benefactor Furnace, a quality welded steel furnace at the price of a cast iron furnace.
- WRITE today for dealer portfolio—EXCLUSIVE territory selling plans.

HESS WARMING & VENTILATING CO.

FOUNDED 1873 1211 S. WESTERN AVE. CHICAGO, ILL



How You Can Win the Verdict

Your customers and the public judge you and your service by the performance of the equipment you sell them.

Win their approval—and the increased business their good will assures you by always selling the Cook 218 Control System for warm air furnaces equipped with blowers.

You can sell the 218 with complete confidence in its efficient performance, safe operation and economy. Installation is simple, easy and inexpensive. The system comprises the thermostat, central control box which is arranged for easy wiring and the bonnet switch which includes limit, fan and safety switches all in one unit. May we send you detailed information?

INSTALLATION— simple, easy, inexpensive.

OPERATION— safe, dependable, accurate.

218

COOK CONTROLS

THERMOSTATS—FURNACE LIMIT CONTROLS
ZONE CONTROLS—BLOWER CONTROLS

COOK ELECTRIC CO.

2670 Southport Avenue Chicago

It's Here!

THE SENSATIONAL NEW

REX AIR-PAK

BLOWER FILTER UNIT

With Patrol Modulator and Complete Automatic Furnace Control!

- Its Low Price Opens a Vast New Market!
- Approved by Leading Authorities!
- Outperforms Other Methods!
- Eliminates Expensive Control Systems!
- Maintains Uniform Temperature Constantly!
- Easier to Install Than the Old Type Furnace Blower!

MAIL THIS COUPON

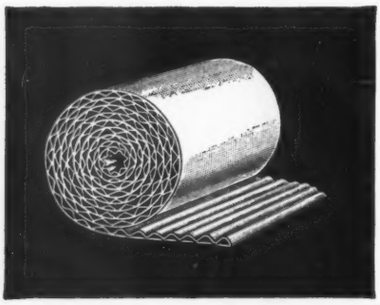
AIR CONTROLS, INC.
1933 West 114th, Cleveland, O.

Name .....

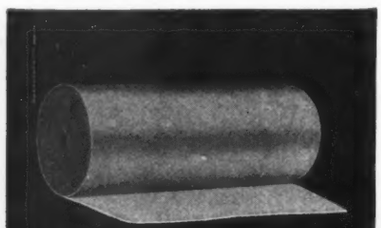
Address .....

City ..... State .....

SAL-MO ASBESTOS PRODUCTS

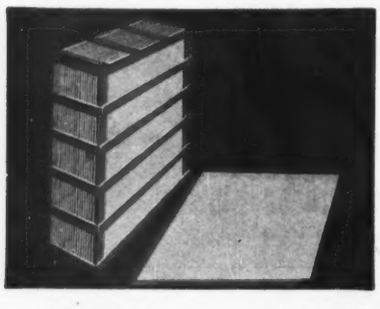


Asbestos AIRCELL and MULTICELL PAPER—250 square feet per Roll.
AIRCELL SHEETS and BLOCKS—in Standard and Special Sizes.



Asbestos PAPER and ROLLBOARD—in Standard weights and widths.
Asbestos PIPE-JOINT TAPE—in 2-inch and 3-inch widths.

Asbestos FURNACE CEMENT—Made from the best grades of asbestos fibre and the finest, high temperature refractory fire clays. Easy to apply, binds and hardens quickly, forms a perfect joint with all metals, fire-brick and stone. Will not crack or shrink.



Asbestos MILLBOARD—in Standard sizes and thicknesses and special sizes cut to order.

WRITE FOR PRICE LIST AND CIRCULARS

SALL MOUNTAIN COMPANY
176 West Adams Street **Chicago, Illinois**

With the Manufacturers . .

Glessner in Hospital

Herbert C. Glessner, treasurer, Excelsior Steel Furnace Co., Chicago, has been under observation in the Presbyterian Hospital at Chicago.

◆

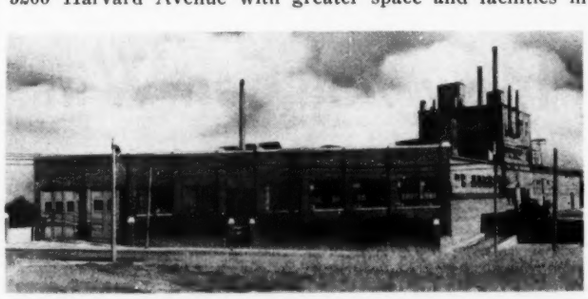
Williamson Conducts School

Williamson Heater Co. conducted a sales meeting and school for representatives in Central Ohio and West Virginia at the Southern Hotel in Columbus, O., recently. Speakers included Allen W. Williams, managing director of the National Warm Air Heating and Air Conditioning Association, Columbus; S. C. Baer, of the Baer Advertising Agency, Cincinnati, and Ralph Sherman, of the Battelle Institute. Gilbert Denges, Cincinnati, conducted the school, which was arranged by Harry E. Hoagland, Columbus.

◆

Air-Maze in New Location

Air-Maze Corporation, Cleveland, is now established at 5200 Harvard Avenue with greater space and facilities in



a modern factory and office building further enabling their policy of rendering quick and efficient service.

◆

Friez Acquires Nicostat

Julien P. Friez & Sons, Division of Bendix Aviation Corporation, Baltimore, Maryland, announces the purchase of the business of Nicostat Products, Inc., of Buffalo, New York.

The Nicostat Company has developed a unique range of magnetic gas valves, providing either slow or quick-acting performance, and based upon the patented principle of the "floating disc." An attractive and moderately-priced Safety Pilot assembly is also included in the range.

The entire physical activity is being moved to Baltimore, and the transfer of personnel to Baltimore includes Nico Borresen, the engineer, and G. F. Knowles, the general manager. Mr. Knowles will take charge of the greatly expanded activity of the "Gas Section" of the Friez Division's Control Instruments Department.

◆

Welding Awards

The Jury of Award of the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, after judging thousands of papers submitted in the $200,000 Award Program, found that savings to industry by arc welding claimed by authors of papers aggregates $1,600,000,000. The Jury's statement was released on September 15th.

Altogether, 382 awards were made by the Foundation. The amounts ranged from $101.75 for honorable mention to $13,941.33, the Grand Award.

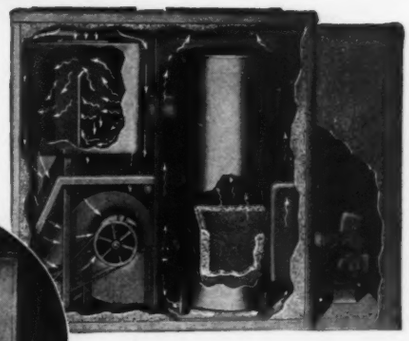
The Grand Award of the Foundation's Program went to Mr. and Mrs. A. E. Gibson, president and stockholder, respectively, of the Wellman Engineering Company, Cleveland, Ohio. The authors jointly received $13,941.33. Their paper is an outstanding treatise on all the elements required to assure the business and technical success of all users of welding throughout industry.

The Foundation's Award Program, which began 18 months ago, was judged by 31 engineering authorities from leading universities and colleges throughout the country.

LET COMFORTZONE and CHEVIRON FURNACES

BUILD UP YOUR SALES!...

THEIR MODERATE PRICES WILL INTEREST YOU

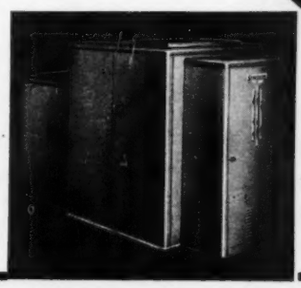


● Not only their low prices, but their high heating efficiency makes it easier to sell the Comfortzone or Cheviron line. These oil or gas furnaces are ideal because you have only one job to handle in order to sell either oil or gas heat. Let us demonstrate to you why dealers everywhere are acclaiming these two lines as America's finest and most popular priced furnaces. Territories available for representatives.

Made in five sizes—from 75,000 to 190,000 B.T.U. output, these completely automatic winter air-conditioning Comfortzone oil or gas furnaces can be purchased with or without burners and controls. This is truly a beautifully designed, highly efficient and ruggedly constructed heating unit.

THE CHEVIRON FURNACES

These large-sized Cheviron furnaces are available in 6 sizes from 250,000 to 500,000 B.T.U. output. Just a few features of its sturdy construction are: Casing: 20-gauge furniture steel in green crinkle finish and chromium trim. Combustion Chamber: 7-gauge flange quality boiler plate steel welded gas tight. Radiators: rectangular of 12-gauge steel.



MICHIGAN TANK & FURNACE CORP.

14101 PRAIRIE AVE., DETROIT, MICH.

AMERICA'S FINEST FURNACES

LOW SPEED . . . HIGH SPEED . . . OFF!

2-Speed Motor *and* **Automatic Control**

Now Available on All Package Units and Assemblies

Model 401 BLO-ETTE

Lau Furnace Blowers

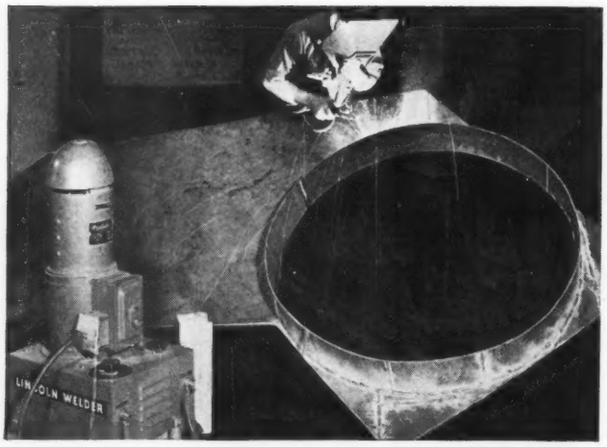
The 2-speed motor and automatic control eliminates "stratification" or varying temperatures of air layers . . . blower speeds are controlled to maintain a more uniform register air temperature for all heating loads. Reduces ceiling temperature . . . increases floor temperature.

Performance...Price!

The many advantages of this new feature cannot be outlined in this limited space. Prices are but very little more than standard units. Prices, data, etc. available on request.

The Lau Blower Company

Dayton, Ohio



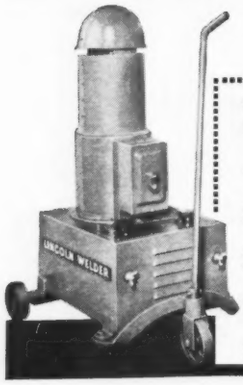
"WE GET BETTER DESIGNS, BETTER WORKMANSHIP AND SAVE 25% WITH OUR LINCOLN WELDER"

★ Mr. Charles Johnson, Precision Sheet Metal Works, Syracuse, New York, credits their Lincoln Welder, "Stainweld A," "Fleetweld 7" and "Lightweld" with a decided improvement in their operations. According to Mr. Johnson, they are now producing stronger, better looking products at savings in material and reduction in fabrication time which give an over-all cost reduction of at least 25%. Products include roof ventilators, blower systems (formerly with lock seams and rivets), ice cream cabinets (formerly riveted) and many other specialties made of black iron, stainless steel, monel metal and galvanized sheets.

Many sheet metal shops have found the Lincoln Welder the key to increased business through specialties, and a means of cutting costs because it simplifies fabrication. Costing less than $200 complete, you can pay for this welder out of savings in a short time. Investigate this tool for increased profits today. Consult the nearest Lincoln office or mail the coupon.

THE LINCOLN ELECTRIC COMPANY

Largest Manufacturers of Arc Welding Equipment in the World



THE LINCOLN ELECTRIC CO.
Dept. EE-534, Cleveland, Ohio

Send free copy of Bul. 314 and payment details on the Lincoln Sheet Metal Shop Welder.

Name _____ Position _____

Company _____

Address _____

City _____ State _____

With the Manufacturers . .

Norge-Tanner Set-Up

Norge Heating & Conditioning Division, Borg-Warner Corporation, 670 E. Woodbridge St., Detroit, announces that Tanner & Company of Indianapolis, Indiana, has been appointed distributors of Norge products—furnaces, air conditioning units, oil burners, coal stokers, gas burners, boiler-burner units, water heaters, blowers and damper controls.

Harry A. Beaman is in charge of the Norge Heating Division for Tanner & Company.

◆

Anthracite Schools in Twenty Cities

Anthracite Industries, Inc., New York City, announce that evening classes of its merchandising school will be formed in 20 key cities this fall and winter.

Starting with an evening school to open in Providence, R. I., on October 3rd, meeting two evenings weekly for a period of six weeks, and extending into every part of the anthracite-burning territory, the schedule of cities to be covered will permit nearly every coal merchant to obtain the benefits of the merchandising course.

The schools to be conducted, during the remaining months of 1938 will be, in addition to Providence:

Boston, Mass., opens October 4th.
Springfield, Mass., opens October 17th.
Albany, N. Y., opens October 18th.
Syracuse, N. Y., opens October 31st.
Buffalo, N. Y., opens November 1st.

Heating contractors and equipment dealers will receive invitations to enroll.

All subjects in the newly-revised course are approached from the merchandising angle, and on the basis of their relation to increasing Anthracite tonnage. An outline of the course includes: Anthracite and competitive fuels; draft and combustion; figuring heating requirements, heat loss; anthracite promotion and management; heating systems; air conditioning; service water equipment; boilers and furnaces; thermostats—boiler promotion; stoker principles and performance; commercial stokers—ranges; and merchandising methods.

◆

Trane Transcontinental Golf Marathon

The Trane Company, La Crosse, Wisconsin, of which Reuben N. Trane is president, air-conditioned the 14-passenger plane used by J. Smith Ferebee while performing his transcontinental golf marathon. Mr. Ferebee crossed the country in four days, playing 72 holes of golf in each of eight cities on the route—Los Angeles, Phoenix, Kansas City, St. Louis, Milwaukee, Chicago, Philadelphia and New York.

The lapse of time between making the new wager in Chicago on Wednesday, September 14, to give Fred Tuerck with whom the original wager was made an opportunity to win back his share of the Virginia plantation, and the tee-off in Los Angeles on September 25, left little time for preparation of the air conditioned plane. Phoned instructions to the Trane factories at LaCrosse started a lightweight semi-portable air conditioner on the way to Los Angeles where it was installed in the airliner on Saturday, September 24.

The important message the Trane Company wished to drive home to the public is that air conditioning should be purchased through established channels—the recognized architect, engineer and heating contractor. Thousands of toy airplanes for the children were launched over the transcontinental course carrying the message "Buy air conditioning through your architect, engineer or contractor." Autographed golf-ball souvenirs for the adults were free at "stop-over" cities, carrying the same message. Ten golden souvenir golf balls worth $1,000 in cash were driven off by Ferebee, each worth $100 in cash when presented to the Trane branch manager in any of the "Stop-over" cities on the transcontinental marathon schedule.

Wrapped in the M-VB Humidifying Package

FOR YOU

½ HOUR'S WORK

A GOOD PROFIT

FOR YOUR CUSTOMER

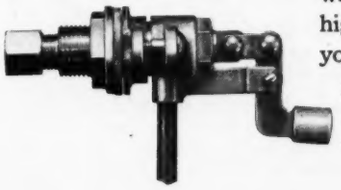
HEALTH, COMFORT

SMALLER FUEL BILLS

NO REPAIRS

The M-VB Humidifier Valve can be installed in 30 minutes without dropping the fire. Keeps water pan always at the right level. Health and comfort protected; furniture kept in good condition; and a big reduction in fuel bills (Tests show that with proper humidification, people are comfortable at 8° lower temperature.)

It costs the customer only a few dollars (4 models, to fit all types warm air furnaces) — and you make a good margin with almost no work. Moving parts clear of water, reducing possibility of failure by corrosion — special seat washer to withstand even unusually high temperatures. Ask your wholesaler to show you the complete unit in one package. Or write us for free booklet.



Saves You Time in Selling—Time in Installing

SCOVILL

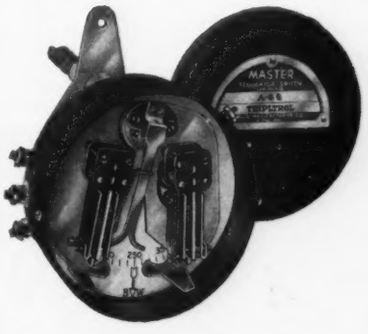
MANUFACTURING COMPANY

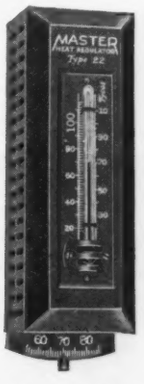
MORENCY—VAN BUREN DIVISION
STURGIS, MICHIGAN

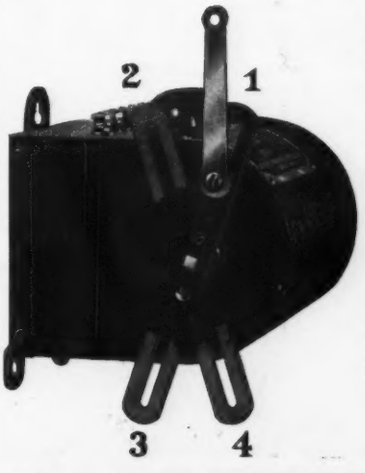
Complete line of water closet tank fittings and humidifier stocks also maintained at Waterville, Connecticut and San Francisco.

The MASTER TRIPLTROL

This new system of controls just announced by the White Manufacturing Co., is built especially for hand-fired furnaces with blowers and is also applicable to hot water heating systems with circulators. The Tripltrol System recognizes the need of functioning from three definite temperatures encountered in the bonnet of a furnace. Through cooperation between room thermostat and bonnet control it coordinates the action of the circulating blower and draft dampers to perfectly meet every condition.







A handy switch on the Tripltrol provides full automatic control of the circulating blower from the room thermostat in the summer. The use of low voltage controls throughout simplifies the installation and eliminates all 110 volt wiring from the furnace or boiler.

WHITE MFG. CO.
2362 University Ave.
ST. PAUL, MINN.

For full information write for Bulletin 900.

MASTER HEAT REGULATOR

News Items . . . . . .

New Retinning Shop

Southern Welding Co., 344 Adams Ave., Memphis, Tennessee, has opened a new re-tinning department and David W. Owen, manager, said that in the few weeks of its operation as the result of an intensive campaign, dairies, packing and cheese industries, as well as hotels, restaurants and cafeterias have made many calls.

The re-tinning of food handling equipment is a specialty. This work has included such items as milk cans, cheese molds, pasteurizers and coils, stock pots, mixing bowls, kettles, meat hooks, trolley hooks, sausage trucks, ice box shelves and a good many items in the baking industry.

◆

Walter C. Bettilyon

Walter C. Bettilyon, 50 Spice St., (Sullivan Sq.), Boston, is operating a strictly supply jobbing business serving the industry in the six states in New England—furnaces, fittings, air conditioners, blower, accessories, and registers.

Mr. Bettilyon has been in the heating business all his life, from an apprentice in the plumbing business to journeyman in the plumbing and heating business. He says he has worked in 47 states in these United States, and belonged to ever so many journeyman's unions. "The Blackstone Hotel in Chicago gave me considerable work as a plumber."

Catalog No. 1, covering Williamson Heaters, Furblo blowers, National boilers and radiators and other heating supplies is being distributed.

Mr. Bettilyon is a heating engineer and was the New England distributor for Williamson heaters for fifteen years before taking over the business in his own name.

St. Paul Vocational School

The St. Paul Vocational School, 14th Street, between Jackson and Robert Street, St. Paul, a public trade school for boys, is distributing a 58-page booklet giving the purposes of the school.

While it is strictly a vocational school, it is a part of the public school system. Instruction is not of engineering level. It does not attempt to prepare for college or professional pursuits. It provides practical and thorough training in the skills and technical phases of each trade for which the training is offered.

In the sheet metal course, the student is given a working knowledge of the tools and material commonly used and is taught methods of assembling these materials. A course in free-hand sketching, pattern drafting and blueprint reading is given to enable the student to read drawings and lay out his own patterns.

According to an agreement between the St. Paul Sheet Metal Working Apprentice Training Committee and the Vocational School, all apprentices in the future must be graduates of the Vocational School or be a high school graduate having exceptional aptitude for mechanics. The Committee referred to is composed of Journeymen from Local No. 76 and Employers from the Sheet Metal Contractors Association.

F. H. Thomas is principal of the school.

◆

Obituary

Louis A. Lambert, former roofing and sheet metal contractor, passed away recently in Virginia, Minn., at the age of 67, after a long illness. He is survived by a widow, four daughters and three sons. His son, Agard Lambert, is now operating the business established by his father.

NEW MODERN DESIGN ★

NIAGARA FOOT GAP SHEARS

It is smart buying to choose a gap shear. 18 inch gap lets you cut sheets longer than cutting length of shear! New modern design provides easy foot operation and convenient handling of sheets. Rigid housings maintain alignment of working parts and accuracy of knife travel. Self-locking eccentrics make it possible to let go of the holddown while stepping on the treadle.
Complete with gages and genuine Niagara alloy steel knives.

Send coupon for Bulletin 80-B.

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Please send copy of Bulletin 80-B.

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NIAGARA

IT'S COMING..!

as a matter of fact you're practically in the middle of it now. WHAT? Why, one of the biggest heating seasons you've had in years, THAT'S WHAT! You'll want to be in the middle of the business, as well as the season, and to get there you'll have to be able to give home owners the most for their money.

The RYBOLT series 157 air conditioning unit automatically assures your prospect of a real "buy." One look at the handsome casing will create the urge to own it, and when you drive home the exclusive RYBOLT features such as slip-on front, surface ground ashpit door, and feed door joints, one-piece radiator and duplex ball-bearing grates . . . you can't help but snag the job. Drop us a line today for sales assistance . . . we've plenty of literature to help you sell this and other RYBOLT units and we'll gladly send it on request.

REGULAR EQUIPMENT

Furnace . . . Furnace Casing . . . Blower Cabinet . . . Blower . . . Motor with variable speed drive . . . Blower Switch . . . Filters . . . Humidifier.

THE RYBOLT HEATER COMPANY
ASHLAND, OHIO

A Sales Booster because it is a Performance Booster !

Better Satisfied Customers–

Your future sales depend upon present satisfaction of your customers. The better satisfied—the more "sold" they are on your service. By recommending and installing the new Swartwout Rotary you MAKE friends — not lose them. Write for prices and literature.

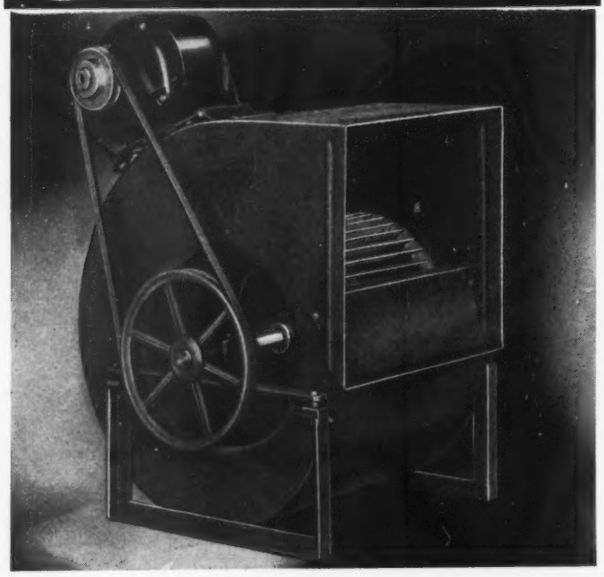
THE SWARTWOUT COMPANY
18615 Euclid Avenue, Cleveland, Ohio

More Efficient Ventilation–

The new Swartwout Rotary is the scientific product of years of ventilation experience and research — the latest development in gravity ventilation. Its performance under all conditions is remarkably efficient.

The NEW Swartwout ROTARY BALL BEARING VENTILATOR

UTILITY



Sound Engineering Principles Insure Customer Satisfaction

Full floating . . . statically and dynamically balanced . . . self-aligning bearings . . . rubber cushion mountings . . . completely die formed . . . baked enamel finish . . . maximum efficiency . . . lower power consumption . . . longer life.

All Year Conditioner

Make extra profits by converting gravity hot air furnaces into forced draft heating plants.

Utility Features:

"Dust-Stop" Filters
Dynamically balanced
Full floating blower
Variable speed pulley
Randall bearings
Solid top — installed by cutting top panel — no special duct fittings.
Minimum floor space
Full range of sizes

Dealers' price, Model 110 DF $39.50

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Send the Coupon TODAY

UTILITY FAN CORPORATION AA
2528 Santa Fe Ave., Los Angeles, Calif.
Please send complete information on your

..... All Year Conditioner
..... Blowers ..... Evaporative Coolers

Name .....
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City ..... State .....

Intermittent vs. Two-Speed Blower

(*Continued from page* 53)

tions occurring during one complete cycle of operation of the fan were investigated in the living room by means of thermocouples placed on a standard which was located in the central axis of the room. The temperature observations were made at intervals of 1 min. during the complete cycle of operation. The differences between the maximum and the minimum temperatures observed at each of the three levels in the room are shown in Table 3. It may be observed that the variations in floor temperature were the same with both methods of operation, but the variations in temperature at the breathing level and ceiling were much smaller with two-speed operation than they were with single-speed operation.

In a third set of tests, which were made in the east bedroom on the second story and in the sun room on the first story, the temperature distribution between the two stories of the house was investigated. It was observed that with two-speed operation, due to the fact that the gravity circulation to the second story rooms was diminished, and the total time that the fan operated was increased, the proportion of the total heat delivered to the first story rooms was slightly greater than that delivered with the single-speed operation. This in itself can be readily adjusted, but it does serve to emphasize the fact that the amount of dampering required on any given duct installation is dependent on the method of fan operation used, and is not the same for both continuous and intermittent operation of the fan.

Table 3—Variations in Temperatures in Living Room[a]

Fan Operation	No. of Tests Averaged	Average Outdoor Temp., F	Maximum Temperature Variation During One Complete Fan Cycle, F		
			At Floor	At Br. Level	At Ceiling
Two-Speed	4	10.9	1.0	2.2	5.6
Single-Speed	2	11.5	1.0	3.2	8.0

[a]All observations made by means of thermocouples. Observations recorded each minute during one complete fan cycle. Tests made with no occupancy, no lights, and under fairly constant weather conditions with mild wind and very little sunshine.

It was indicated in a previous study that, in the case of all of the second story rooms, the temperature variations were small. Observations of temperatures in the east bedroom indicated that the actual temperature gradients from breathing level to floor were the same for the two methods of fan operation, and furthermore that the maximum variation in temperature in the living zone did not exceed 0.9 F. for both series. It may be concluded, therefore, that the use of the two-speed fan did not change the very favorable conditions that existed in the second story rooms when the single-speed fan was in use.

In the case of the sun room, on the first story,

"GET BUSY INSTALLING THIS AIR CONDITIONING JOB"

SAYS THE BOSS

IF YOU DON'T KNOW HOW HE'LL FIND SOMEONE WHO DOES!

You can't expect to get ahead in this business unless you know Air Conditioning. It may come to the point where you'll either have to know Air Conditioning or lose your job to someone else who does.

PROTECT YOUR JOB AND FUTURE

Learn Air Conditioning NOW! Train at Home in spare time with U. E. I. . . . the oldest school devoted exclusively to Air Conditioning and Refrigeration. Learn Installation, Maintenance and Service Work, as well as Estimating and Designing by methods approved by leading Manufacturers and Distributors of Air Conditioning Equipment. Get practical experience in our large completely-equipped laboratories if desired. Send name and address for complete details regarding this training program and U. E. I. low-cost, easy-pay plan.

ATTENTION EMPLOYERS

If you need a man trained in Air Conditioning for Installation, Service, Shop or Sales Work, get in touch with U. E. I. Our Free Placement Service can recommend a TRAINED Man to fill the position. Men available in all parts of the country.

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Get Your Copy of This New Designing Manual Now!

SECOND EDITION
PLATTE OVERTON'S

"FORCED AIR HEATING"

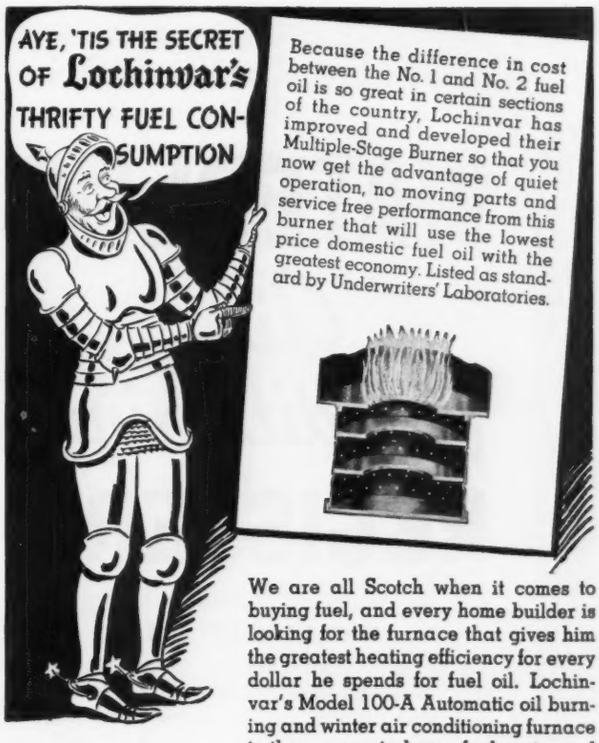
215 Pages—6" x 9"—Illustrated—$2.00

Here is a book that will save you hours of time in the planning of your forced air heating jobs, as well as help you to avoid errors in your calculations. Outlined in it is a model procedure of design, based on wide experience, which you may follow with absolute confidence on any of your own jobs.

"Forced Air Heating" embodies all of the really worthwhile new data on forced air heating that has been developed through research and experience over the past several years. It illustrates by clear and concise examples the proper application of this new knowledge in actual designing work. Fifteen helpful charts, 23 time-saving formulas, and 19 practical tables are included with detailed explanations of their proper use.

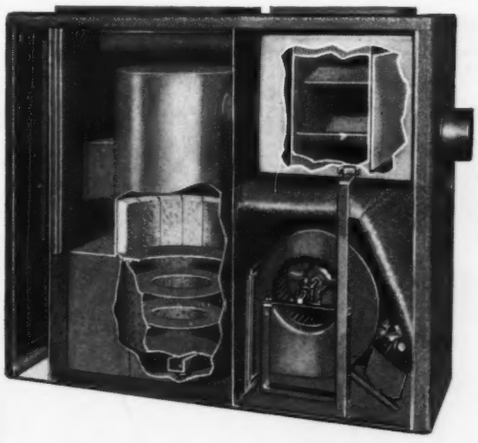
Every contractor now doing or planning to get into forced air work should own a copy of this book. Send $2.00 today to the address below for your copy. You may order with the privilege of returning the book within 10 days for a refund if it should for any reason prove unsatisfactory.

KEENEY PUBLISHING COMPANY
6 N. Michigan Ave. Chicago, Ill.



Because the difference in cost between the No. 1 and No. 2 fuel oil is so great in certain sections of the country, Lochinvar has improved and developed their Multiple-Stage Burner so that you now get the advantage of quiet operation, no moving parts and service free performance from this burner that will use the lowest price domestic fuel oil with the greatest economy. Listed as standard by Underwriters' Laboratories.

We are all Scotch when it comes to buying fuel, and every home builder is looking for the furnace that gives him the greatest heating efficiency for every dollar he spends for fuel oil. Lochinvar's Model 100-A Automatic oil burning and winter air conditioning furnace is the answer to lower fuel costs, and dealers are recognizing this by the increased demand for the Lochinvar Model 100-A, a truly efficient and trouble free unit, that is as modern in design as the new motor cars. Why not let us tell you more about the Lochinvar line—write today for details.



LOOK AT THESE FEATURES!

1. Double front casing concealing controls.
2. Boiler plate steel welded furnace. 9200 square inches heating surface.
3. New type radiator.
4. Fire brick lines combustion chamber.
5. Larger Blower 1700 C.F.M.
6. Four Filters.

Lochinvar also manufactures the Model 100 and Junior-Aire completely automatic oil burning furnaces, and the famous Lochinvar automatic oil burning water heater. All units are listed as Standard by Underwriters Laboratories.

THEIR LOW PRICES WILL INTEREST YOU

LOCHINVAR CORPORATION,
14247 Tireman Ave.,
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Gentlemen:
Please send complete information about—
( ) Model 100-A Furnace ( ) Model 100 Furnace
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WATERLOO
Air Conditioning
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WRITE FOR DETAILS

Get acquainted with the fast-selling Waterloo line. Send for your Free copy of the new illustrated catalog, with charts, installation data, prices.

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Cuts Any IRREGULAR SHAPE FROM SHEET METAL

Ideal for use on auto bodies; blowers, fan and air conditioning equipment; conveying equipment; railway coaches; signs, machines and tools, agricultural implements, etc.

Cut can be started in center of sheet without starting hole. No further finishing required. The metal is sheared, not punched. Easily operated.

There's a Libert distributor in your territory—or write for complete information.

LIBERT MACHINE CO. Green Bay, Wis.
Manufacturers of shears since 1915

Libert Hi-Speed SHEAR

and for tests made with an outdoor temperature of 6 F., it was observed that the use of the two-speed fan was accompanied by an increase in the magnitude of the living zone temperature of 0.6 F. and by a decrease in the maximum temperature deviation in the living zone of 0.4 F., as compared with similar values obtained with single-speed fan operation. Both tendencies indicate that more favorable conditions were maintained with the use of the two-speed fan.

Summary

The use of a two-speed fan, that operates at low speed during the greater portion of the heating season and at high speed during heavy heating demands only, requires a more expensive motor and a more complicated control system than is required for the simpler single-speed fan operated intermittently. The total operating costs, including those for oil fuel, and for power consumed by the burner motor and fan motor, were approximately the same with both methods of fan operation. In the case of the two-speed fan, however, the fan was operated a greater proportion of the day, the total number of the primary off-periods of the fan was decreased, and the average duration of the off-periods of the fan was diminished. Furthermore, the temperature conditions in the room were improved. The temperature and comfort conditions in the second story rooms, which were entirely satisfactory with single-speed fan operation, were not changed when a two-speed fan was used. In the first story rooms, not only did the two-speed operation tend to increase the magnitude of the temperatures in the living zone, but it decreased the temperature fluctuation during each fan cycle. These improvements in the comfort conditions, consisting not only of a substantial reduction in the number and lengths of off-periods of the fan per day, but also of a noticeable improvement in the variations in air temperature in first story rooms, are such that the use of a two-speed fan should be given consideration in the application of forced-air heating to small and medium sized installations. The accompanying factors of quiet operation and more moderate air movement in the rooms may also be considered as advantageous features.

Table 4—Effective Temperature in Living Zone with Various Temperature Differentials

(Based on breathing level temperature of 72 F.)

Air Temperatures, F			Effective Temperature In Living Zone,[a] Degrees
Breathing Level	Floor Level	Average Living Zone	
72	72	72.0	66.1
72	71	71.5	65.7
72	70	71.0	65.4
72	69	70.5	65.0
72	68	70.0	64.7
72	67	69.5	64.3
72	66	69.0	64.0
72	65	68.5	63.6
72	64	68.0	63.2
72	63	67.5	62.8

[a]Effective temperature based on a relative humidity of 30 per cent. Values would be increased approximately 0.6 deg. for a relative humidity of 40 per cent.

[Part 3 will follow.]

THERMO-DRIP HUMIDIFIERS let

You Get Away from Profitless Servicing

It takes no lengthy explanation to tell you why THERMO-DRIP installations give you freedom from complaints and profitless servicing. They come equipped regularly with **stainless steel** vapor pans. That licks the trouble rust and corrosion can cause . . . eliminates pan replacements. Their **Monel metal** valves resist wear as well as corrosion . . . overcome liming and flooding. The **bimetal thermostat** operates according to physical laws of balancing moisture and temperature . . . and physical laws outwear mechanical parts. No other humidifier gives you this triple assurance of service-free installations. Push THERMO-DRIP Humidifiers . . . and keep the profit!

Stainless Steel

PANS ADD NOTHING TO THE COST OF THERMO-DRIP. YOU GET

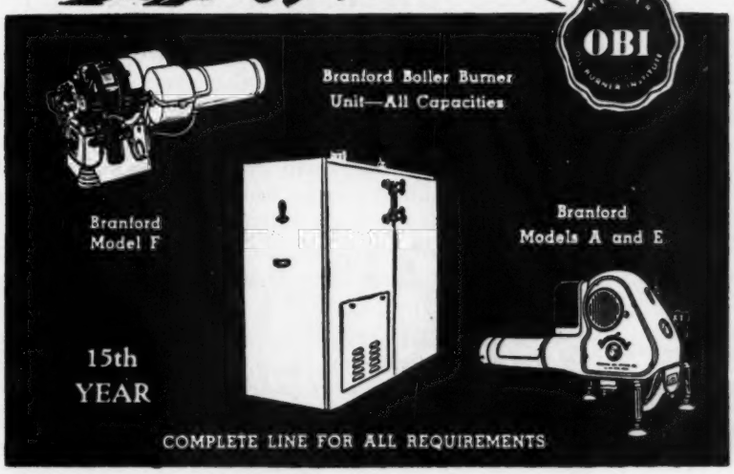
More for Your Money!

AUTOMATIC HUMIDIFIER CO.

18th and Main Streets CEDAR FALLS, IOWA

All pulling together to WIN! that's how the

BRANFORD



FRANCHISE helps you

Strength and rhythm in that stroke oar of full factory cooperation — well spaced effort passed along to you to keep sales smooth running. Today the Branford Franchise helps many dealers. We know it will give you new power. Get the details and also the new Branford Booklet comparing burners piece by piece. Only data of its kind published.

THE BOOKLET SOUNDS GOOD

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Gentlemen: Send Booklet and the franchise information.

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Address .....

SELECTAIR

AIR FILTERS, humidifier and heat transfer units are all arranged in compact design directly above the boiler in this fine air-conditioning unit... Selectair offers every desired feature for economically heating, air-conditioning and ventilating the modern home... Domestic hot water the year 'round... Oil fired by the Johnson Pressure-Type Burner, Selectair is fully automatic, maintaining constant humidity and temperature in the home whatever the weather may be outside.

Worthwhile territories and Johnson franchises available to aggressive dealers anxious to serve their communities with a complete line. Write us today giving full details as to qualifications.

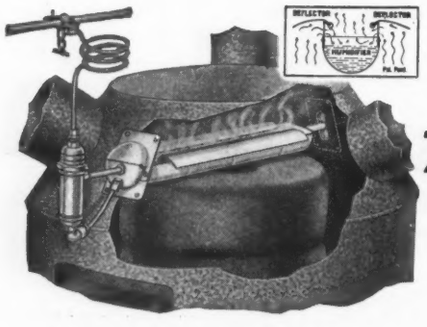
MEMBER OBI OIL BURNER INSTITUTE

S. T. JOHNSON CO.

940 ARLINGTON, OAKLAND, CALIFORNIA
401 N. BROAD ST., PHILADELPHIA, PA.

THERE'S A JOHNSON OIL BURNER FOR EVERY PURPOSE

You Can Get the Job and Make a Good Profit with The Zephyr Automatic Humidifier



The Zephyr and twelve other types of humidifiers are built to give maximum satisfaction and performance. Yet, these Maid-O'-Mist Humidifiers are priced within the reach of all.

The Maid-O'-Mist Line also includes a complete choice of Automatic Water Feeders for bucket type humidifiers and air conditioning units.

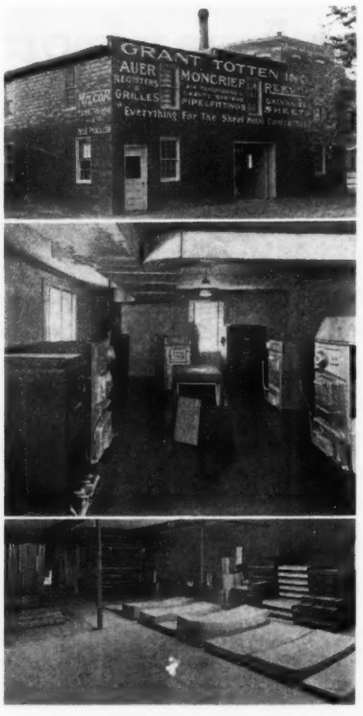
No. 50-F
Water-Boy Midget Feeder

Send Today for CATALOG A-10 with specifications and prices.

MAID-O'-MIST, Inc.
180 N. Wacker Drive, Chicago, Ill.

News Items . . . . . .

Grant Totten Display Room



Grant Totten, Inc., 1215 McKinley Ave., S. W., Canton, Ohio, recently completed a heating display room — 20 x 20 — with the walls and ceiling of Milcor Spanish Texture metal, for the exclusive use of dealers to display heating equipment to their prospects.

The company was founded in 1921 by Grant Totten. They now have a total of 10,000 sq. ft. of storage space, carry a complete line of Milcor pipe, trough and fittings, Moncrief furnaces, air conditioning equipment and fittings, Auer registers and grilles, Reeves steel sheets, Chase copper, Watson roofing and asbestos products and handles furnace repair parts.

C. E. "Jim" Wilcox, is secretary and treasurer.

◆

Stoker Performance

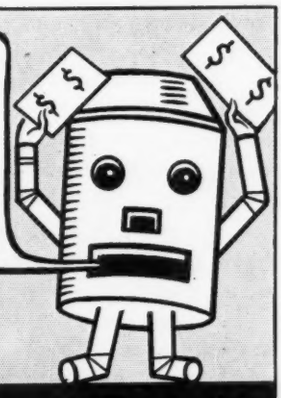
(*Continued from page* 65)

firing, or $69.40 for a normal season, and indicates a reduction of 20.6 per cent in favor of the stoker. Fairness here compels us to ask what kind of coal was used during this year of hand firing (1933-34) and what was the price per ton. The record shows that 5.07 tons of it was Mine Run at $4.38 per ton, 2.91 tons of Lump at $5.38, and 4 tons of Lump at $6.75. All of these prices are higher than the average price of coal for the stoker during the season of 1936-37. The average cost of coal during the whole period of hand firing was $24.35 per thousand degree-days. For fuel and electricity during the two years of stoker firing, the average cost was $16.36 per thousand degree-days, a reduction of 32.8 per cent in favor of the stoker.

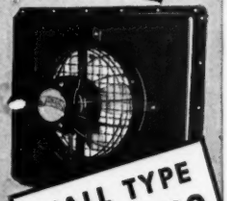
Use of the stoker also reduced the amount of attention required by the fire; the average number of visits with the least satisfactory coal was 1.353 per day; on one occasion, four visits were required in one day. With better coal, less attention was necessary. The best coal required practically only one visit daily. Slack and other cheap coal is liable to be especially annoying in mild weather, due to the delicate balance that must be maintained between coal feed and air supply.

When the rate of fuel feed is properly adjusted

Easy Profits Making COLD ROOMS Warm and Cozy!



FLOOR TYPE LIST PRICE $7.50



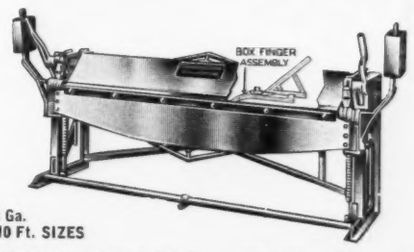
WALL TYPE LIST PRICE $10.00

VICTOR HEAT BOOSTERS

IT takes less than three minutes to cure any cold room with a Victor Heat Booster. The powerful fan first pulls out the cold air "cork" and then brings up the heat in a hurry. Overcomes sluggishness of long horizontal runs or undersized ducts. Counteracts abnormal drafts or lack of proper insulation or weatherstripping. Help yourself to extra profits by pushing Victor Heat Boosters—a demonstration will sell four out of five home owners. Write for complete details today!

VICTOR ELECTRIC PRODUCTS, INC.
838 Reading Road Cincinnati, Ohio

BENDING BRAKES **WHITNEY-JENSEN** METAL TOOLS



12-14-16 Ga.
4-5-6-8-10 Ft. SIZES

BENDING BRAKES

• ORIGINAL welded box-type construction features lightness combined with greater strength, stiffness, accuracy, and durability. COMBINATION TYPE—for box and pan work as well as all kinds of straight bending. Write for circulars describing these, and important new lighter machines.

Now Featuring
ROLLER BEARINGS
REDUCE EFFORT required by 12%-90%! Needle-type bearings on apron, clamps, and toggles bring new ease and efficiency to users of Whitney-Jensen Brakes! Lower costs, speed up work.

Nos. 7, 7½, 8—Imperial

No. 10

PUNCHES FOR ALL PURPOSES

• Famous long-lasting, light-weight, powerful, accurate Whitney-Jensen Punches popular in leading shops. Write for Catalog No. 11.

WHITNEY METAL TOOL CO. • 91 Forbes Street, Rockford, Illinois

REPAIR PARTS?

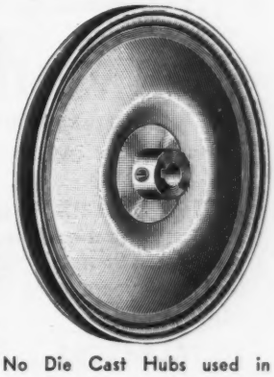
. . . to fit every make and description of heating or cooking unit may be secured immediately upon order . . . and you can bet that if it's the finest quality at a low price you are seeking. . . .

CAPITOL HAS IT!

CAPITOL FURNACE AND STOVE REPAIR CO.
229 So. Meridian, Indianapolis, Ind.

BALANCED — TRUE RUNNING — QUIET AT ALL SPEEDS

MAUREY ALL-STEEL V-PULLEYS

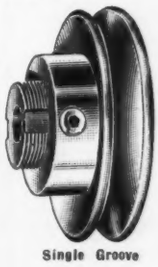


. . . will solve your Pulley problems if you need Pulleys for Blowers, Stokers, Fans and Air Conditioning Units where long time DEPENDABILITY is of utmost importance.

Made of STEEL with heavy roll finished edges, and hubs machined from SOLID STEEL or malleable iron. No Die Cast Hubs used in MAUREY PULLEYS.

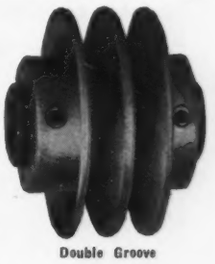
Carried in stock in a wide variety of sizes for "A" and "B" belts.

MAUREY Variable Pitch Diameter Pulleys



Single Groove

Solid steel construction. Adjustment permits speed variation of as much as 30%. Fine, accurate, milled threads, 20 to the inch, assure close adjustment. Designed for Air Conditioning Units. Solid steel — not die cast. Made in 4 sizes, 3¼" to 4½ inches in diameter.



Double Groove

MAUREY MANUFACTURING CORP.
Wabash at 29th Chicago, Ill.

"HAVE CLARAGE MAKE THEM"

Every year we ship to furnace manufacturers and to builders of unit air conditioners thousands upon thousands of Clarage Blower Wheels and Assemblies. These smaller units were designed with the same skill characteristic of the larger Clarage equipment — just as carefully constructed — just as carefully tested. And we have sizes to meet ALL REQUIREMENTS — with slow speed operation insuring SILENT PERFORMANCE. May we have your next inquiry?

SPECIFY CLARAGE for COMPLETE AIR CONDITIONING · VENTILATION · HEATING · COOLING · MECHANICAL DRAFT · FANS & BLOWERS FOR INDUSTRIAL NEEDS

CLARAGE FAN COMPANY • Kalamazoo, Mich.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

METALBESTOS
INCORPORATED

GAS VENT & FLUE PIPE

FULLY COVERED BY PATENTS

APPROVED BY UNDERWRITERS' LABORATORIES, INC.

METALBESTOS is not a pipe used INCIDENTALLY for venting gas appliances—it is made expressly for that purpose. Its performance over a period of years more than justifies our claims as to its merits.

METALBESTOS consists of a pure aluminum pipe within a galvanized steel casing of a diameter one inch larger than the inner pipe. The two members are held in centered position by vitrified asbestos spacer rings, thus providing a one-half inch circulating air space completely around the inner aluminum pipe.

The installation of METALBESTOS guarantees proper draft—Safety—Durability and low installed costs.

WILLIAMS-WALLACE CO.
160 Hooper Street
San Francisco, Calif.

We are interested in your METALBESTOS GAS VENT and FLUE PIPE. Send along your catalog and price list!

NAME .....

STREET ADDRESS .....

CITY and STATE.....

to the air supply, and the "hold-fire" control is set so as to keep the fire alive while yet avoiding overheating, the stoker can be expected to keep the house temperature very nearly constant. The best of our records showed a variation of two degrees. Constant temperature is harder to maintain in mild weather, especially with cheap grades of coal. When warm days and cool nights are the rule, there is likely to be some overheating in the daytime. This is, of course, true also of hand firing.

The blowing action of the stoker causes a greater accumulation of fly ash in the furnace passages and smoke pipe than with hand firing. These passages may have to be cleaned once or twice during a heating season, depending, of course, on the characteristics of the coal.

On the whole, the operation of the stoker was quite satisfactory. All of our few troubles consisted of rebuilding the fire and emptying the furnace of coal when the fire became choked with too much slack and dust. Most of this might have been avoided by more frequent attention and adjustment, such as one could give the furnace in one's own house when some of the family would be at home most of the time.

It must be admitted that, in spite of its undoubted advantages, a stoker of the type used in this experiment will not entirely eliminate dirt from the furnace or give the householder complete freedom from its care. There will still be some coal dust, some ashes will fly, and the furnace will still require some intelligent attention. In all these things, however, the stoker does give a substantial improvement over hand firing. The type which fires its coal directly from the bin and disposes of its own ashes should do even better.

In some places, special stoker coals are available, properly sized and, in many cases, made dustless with oil or other material. No such coal could be had in this locality and, indeed, the purchaser often had to take whatever kind he could get. Such a situation is bound to cause annoyance and the necessity for increased attention to the furnace. Full benefit of the stoker cannot be realized until and unless suitable fuel is consistently available.

◆

Seed Corn Drier

(*Continued from page* 46)

and the drying air humidity 10%." Opinions differ as to the temperature of the air entering the drying bins not exceeding 110° F. because of the possibilities of reduction in germination of the seed corn when higher temperatures are used. This danger is greatest with corn of high moisture content and for this reason some driers have been operated with a temperature of 100° for the first 24 hours and then increased to 110° F. for the duration of the drying period. To insure good control

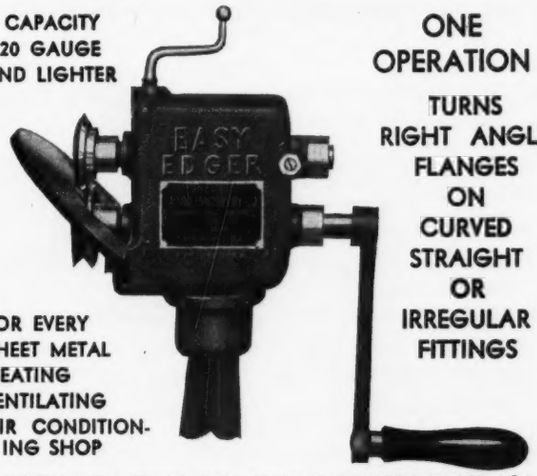
THE EASY EDGER

A FLANGING MACHINE THAT FLANGES IN—

CAPACITY 20 GAUGE AND LIGHTER

ONE OPERATION

TURNS RIGHT ANGLE FLANGES ON CURVED STRAIGHT OR IRREGULAR FITTINGS



FOR EVERY SHEET METAL HEATING VENTILATING AIR CONDITIONING SHOP

NOTE—WILL TURN ONE HEIGHT FLANGE ONLY (3/8)

MORE SIMPLE THAN A BURRING MACHINE | NO GAUGES TO ADJUST | SPEEDY ACCURATE UNIFORM EDGES

WRITE FOR DETAILS

WARD MACHINERY COMPANY

564 W. WASHINGTON BLVD.

CHICAGO ILLINOIS

"Precision Manufacture"

If you could watch the manufacture of Allen Multi-Vane Turbine Ventilators you would know why users say, "Allens outlast the building." The perfection of their engineering, design, materials and production methods combine to give them endurance on which the years seem to have no effect.

Constantly, steadily pulling out the foul air, they supply cost-free ventilation for any type of building, at any rate of suction, from the midget 6" to the giant 48".

Let us supply the Allen literature for your files.

THE ALLEN CORPORATION

9752 ERWIN AVE., DETROIT, MICH.

ALLEN TUBINE VENTILATORS

Handsome and Durable...

REGISTERS by ROCK ISLAND

When you install Rock Island Registers or Air Faces you have the satisfaction of knowing that you are putting in material of sound design and lasting beauty. You will find them easy to install, and that they will be entirely satisfactory to your customers.

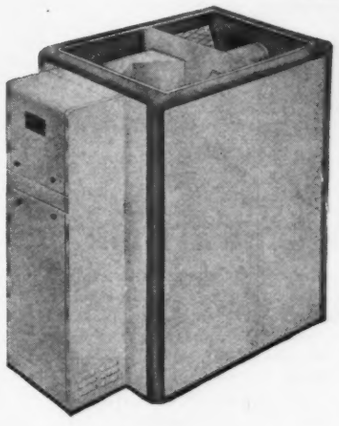
Our free estimating book gives net cost on individual runs of warm-air and cold-air pipe. Also net prices on registers, piping and general supplies. Valuable tables and information on blowers, forced air and gravity systems. Write for it NOW!

ROCK ISLAND REGISTER CO.

ROCK ISLAND ILLINOIS

2 THINGS

PRICE and QUALITY Make This



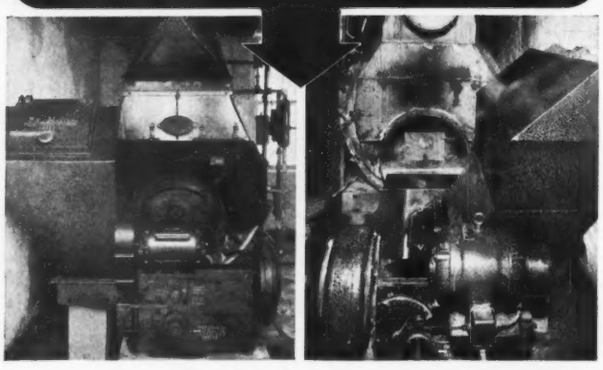
THE FASTEST SELLING WARM AIR CONDITIONING LINE

PERFECT BURNER CO.

LYNN MASS.

Some Good Distributor Territories Are Still Open

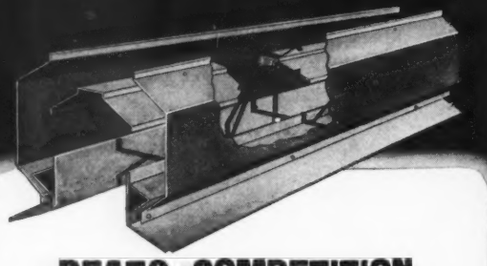
Don't Lose Stoker Sales! YOU CAN FIRE SCOTCH MARINE TYPE BOILERS Successfully WITH KōL-MASTER



• No need to build "dutch ovens" or to try any other make-shift arrangement! Kol-Master is installed right in the fire tube, provides more combustion space than original hand-fired grates! Kol-Master maintains proper combustion conditions with its patented, exclusive automatic combustion control; secures uniformly even coal distribution full length of the fire box with its patented, exclusive long, low, narrow retort . . . dividing plates . . . "reverse-flight" feed screw. *Only* Kol-Master can fire these tough jobs *so successfully!* Get details. We will gladly cooperate with all stoker dealers who are not directly in competition with Kol-Master dealers.

*Write for Catalog 300 and Bulletin 503
KOL-MASTER CORP., OREGON, ILLINOIS

BURT Monovent
Continuous Ridge VENTILATOR



BEATS COMPETITION

When a contractor or building owner talks "price," then is your opportunity to talk Monovent. Costs one-third less than unit ventilators and presents much better appearance. Especially adapted for residences, schools, public buildings, etc. Easily installed on any type of roof. Produces high ventilating capacity with uniform distribution of air movement. Burt Engineers will help you figure and lay out plans. Write for catalogs.

THE BURT MFG. CO.
Roof Ventilators • Oil Filters • Exhaust Heads
301 MAIN STREET AKRON, OHIO

of temperatures, thermostats located in the warm air supply duct near the bins should be used to control the oil burner or stoker.[2] The driers tested had thermostats located midway from front to back in the upper and lower ducts, being reversed by a switch at the same time the supply air dampers were changed. These thermostats were set at 115° F. From tests made in the ducts the following results were noted:

North Drier:

Air entering main duct = 118° F.; relative humidity = 30%.

Air at end of duct = 116° F.

Return air emptying in furnace room = 100° F.; relative humidity = 56%.

Outside air = 64° F.; relative humidity = 60%.

South Drier (at the same time):

Air entering main duct = 118° F.; relative humidity = 16%.

Air at end of duct = 114° F.

Return air at exhaust door = 106° F.; relative humidity = 24%.

Return Air Relative Humidity

As to the relative humidity in the return air, Professor R. H. Wileman of Purdue University states in his letter, "as long as the volume of air passed through the corn is sufficient to remove the available moisture without having a relative humidity over 75 to 80% in the air discharged from the bins, little advantage is obtained from increasing the volume of air passing through the corn." Tests were made on various days and some of them shown below. At no time was the relative humidity in the return air found to be more than 66% and that was in the North drier, the return air from the South drier being much less.

North Drier—air emptying into furnace room from return duct.

Degrees F.	Relative Humidity	Outside Temperature	Outside Rel. Hum.
104°	33%	58°	40%
100	40	56	44
100	56	64	43
102	52	62	50
102	37	64	59
102	54	70	62
100	56	64	60

South Drier—air at exhaust outlet.

Degrees F.	Relative Humidity	Outside Temperature	Outside Rel. Hum.
104°	38%	70°	62%
106	24	64	60

The use of a stoker for firing the furnace was found to be very satisfactory because of the constant temperature of the drying air. Several operators of corn driers now use automatic stokers. These stokers are economical of fuel and are particularly useful because they maintain an even temperature. They practically eliminate the hazard of using too high temperature and avoid losses that result from an up and down heat supply.

[To be continued]

500,000 REASONS FOR *Randall* POPULARITY

Randall Standard Pillow Block (single reservoir) with large special oiler.

Today more than 500,000 Randall Pillow Blocks are giving remarkable, quiet service in the field. They are proof of Randall's claim to exceptionally long life and care-free operation.

To those of you who do not use Randall Bearings we urge a trial to show you the value of a Randall installation.

Write today for catalog describing our complete line of pillow blocks.

Randall GRAPHITE PRODUCTS CORP.
Dept. 1011 609 W. Lake St., Chicago, Ill.

EVERYTHING YOU'VE WANTED IN A FURNACE CEMENT

Here's a furnace cement that will live up to all of your expectations; a plastic, easy-working cement that is used and approved by the country's leading furnace manufacturers and repair men. It adheres to both sides in a joint making it gas tight. Tharco is an "asbestos fiber" Furnace Cement; will withstand intense heat and direct flame. Is odorless, indestructible, fire and acid proof. It will not shrink, and if properly applied, will not honeycomb or powder. Try this time tested furnace cement on your next job. You'll be surprised at the difference.

WRITE FOR FREE SAMPLE

THE ARMSTRONG COMPANY
DETROIT DALLAS CHICAGO

Outstanding Products for more than 25 years

PROFITS with: *Peerless*
PACKAGE UNITS
FOR CONVERSION JOBS!

Use them for new installations too.

Peerless makes both blower and motor — motor specially designed for blower duty.

Place a Peerless on your floor—Run it for your customers.

Write for Prices Today

Since 1893 — Only the Best

FAN & BLOWER DIVISION
THE PEERLESS ELECTRIC CO.
WARREN, OHIO

PREMIER FURNACE CLEANERS
COMPLETELY EQUIPPED

HALF HORSE POWER MODELS
60.00 and 64.50
ONE HORSE POWER MODELS
84.50 and 89.50

Premier Furnace Cleaners are powerful and light weight, yet sturdily built to stand years of rugged service. Weighing less than 50 pounds, they are one-man cleaners and have been the furnace man's favorite for years. Premier Cleaners are ideal for upstairs use and may be used independently from the container for suction and blowing use in cleaning air ducts, registers, grills, radiators and air conditioning equipment.

Motor specifications for these powerful cleaners are:
½ H.P. maximum vacuum 31 inches in water.
1 H.P. maximum vacuum 46 inches in water.

Business-Getting, Return Post Cards are Available for Dealers at Low Cost

Buy It From Your Local Jobber or Write the Manufacturer

Furnace Cleaning Instruction Booklet Free with Each Cleaner

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Road · Cleveland, Ohio

Time Payment Plans

(*Continued from page* 38)

in good credit standing and pays the dealer cash for any balance due, or if the dealer's account with the manufacturer is not balanced, the funds to go to the manufacturer for the credit of the dealer.

Another manufacturer states that they pay the unpaid balance due on the contract to the contractor immediately, and may or may not rediscount with the finance company, depending on their cash requirements for manufacturing and sales purposes. "No holdback—100 per cent advance" is reported by another manufacturer. Another reports that they may pay the contractor in full in cash, or they may not, according to the terms of the agreement made with the contractor. Under one plan the finance company draws a check for the unpaid balances less the finance charge, upon receipts of the conditional sale or chattel mortgage contract with installation certificate, payable to the dealer and the manufacturer jointly. The manufacturer in turn credits the check to the account of the dealer and issues a check to the dealer for the difference between the amount received and the amount of their invoice covering the equipment which the dealer installed. The dealer thereby discounts his paper on a 100 per cent basis.

INDEPENDENT "Fabrikated" REG U.S. PAT. OFF.

adjustable

DIRECTED AIR FLOW REGISTERS *and* GRILLES

Each grille bar can be set individually to direct air flows right or left or up or down, either at the time of installing, or after the system is in operation.

THE INDEPENDENT REGISTER CO.
3747 E. 93rd ST., CLEVELAND, OHIO

INCREASE PROFITS *with*
THE GRAND RAPIDS FURNACE CLEANER

Powerful—One-Man Portable
Sturdy

The first Grand Rapids Furnace Cleaners put out years ago are still in use. Dealers say they are the best with no wear out to them.

Free Trial—Convenient Terms
Write for Details

GRAND RAPIDS FURNACE CLEANER CO. 225 STEVENS ST., S. W. GRAND RAPIDS, MICHIGAN

THE PUBLIC DEMANDS QUALITY!
Chalmers has it

17 YEARS of active experience! Used widely in America, Europe, Asia and Africa. Carries Underwriters and New York City approval. Used by the U. S. Government. Adapted to Boiler-Burner and Furnace Units. New literature available for interested dealers — Write today. Use your letterhead, it stimulates us!

CHALMERS OIL BURNER CO. 1251 Central Avenue MINNEAPOLIS, MINN.

CENTURY
ZEPH-O-LATOR
85%
OVERALL EFFICIENCY
CENTURY ENGINEERING CORP.
CEDAR RAPIDS IOWA

CHICAGO

PRESS BRAKE HAND BENDING BRAKE
Steel Brakes—Presses—Shears

DREIS & KRUMP MFG. CO.
7404 LOOMIS BLVD. CHICAGO

WHITNEY LEVER PUNCHES

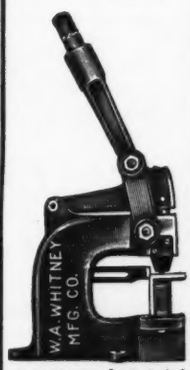
No. 4B PUNCH

Length—8½ inches. Capacity ¼-inch through 16 gauge. Deep Throat—2 inches. Weight—3 pounds. Punches and Dies—⅛" to ⅜" by 64ths.

No. 6 PUNCH

Length—26½ inches. Capacity — ¼-inch hole through ⅜-inch iron; especially adapted for button punching or templet work. Punches and dies 1/16" to ⅜" by 32nds.

No. 91 PUNCH



Capacity — ⅝-inch hole through ¼-inch, 1-inch hole through ⅜-inch and 2-inch hole through ⅛-inch iron. Depth throat 5 inches. Weight—82 lbs.

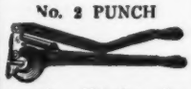
We have tools for every purpose needed by Sheet Metal Contractors.

Ask your Jobber

No. 1 PUNCH

Length — 34 inches. Capacity — ⅜-inch hole through ¼-inch iron. Punches and dies in sizes from ⅛ to ⅜ by 64ths.

No. 2 PUNCH



Length — 23 inches. Capacity — ⅜-inch hole through ¼-inch iron. Punches and dies in sizes ⅜-inch to ½-inch by 64ths.

CHANNEL IRON PUNCH

Companion to No. 2 Punch. Every part of the two Punches Interchangeable, including punches and dies. Capacity—¼-inch hole through ¼-inch iron.

W.A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL.

A FULL STOCK

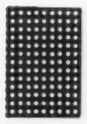
Every kind of repair part to fit that you may need is ready, awaiting your order at Central. Central parts make repair jobs easier, and easier repairs mean more profits. Write for full information and catalogue today.

FURNACE REPAIRS

CENTRAL
FURNACE & STOVE REPAIR CO.
3937 Olive St. St. Louis, Mo.

PERFORATED METALS

Every Sheet Metal Worker needs perforated metal in one form or another.



Everything in perforated metal.

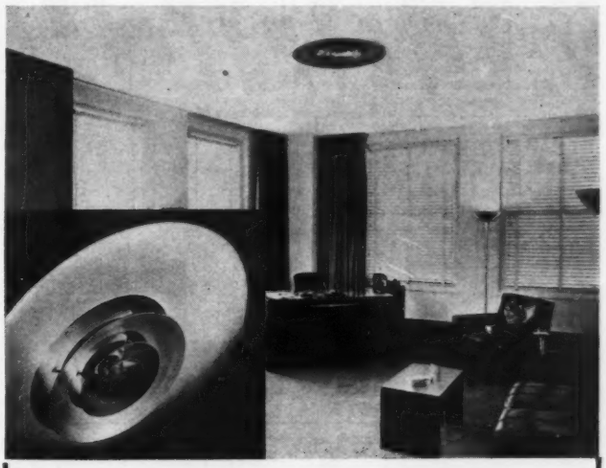
Finely perforated brass and tin-plate can be shipped quickly from our stock. In brass these sizes include No. 00 holes (.020" in diameter) to No. 8 holes (.138" in diameter); in tin plate—No. 1 holes (.027" diameter) to No. 8 inclusive.

You may find it convenient to draw upon this stock.

Aluminum, monel metal, copper, or other metals are perforated to order.

For processing food products and to withstand certain chemicals special alloys are offered. Write us if you have such problems.

The Harrington & King PERFORATING CO.
5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.



ANEMOSTAT
HIGH VELOCITY AIR DIFFUSERS

which have no moving parts are easily installed. We will be pleased to furnish upon your request drawings showing many methods of fastening the Anemostats to ducts and other installation data.

ANEMOSTAT CORPORATION OF AMERICA
10 East 39th Street New York, N. Y.

AN-26-A

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 98.

306—Ducts and Fittings Estimator

Corbman Bros., Inc., 1205 North Fourth St., Philadelphia, is distributing Catalog No. 7AC—an estimator for JustRite simplified system prefabricated ducts and fittings for forced air and air conditioning installations.

◆

307—Stoker Questions and Answers

The Will-Burt Company, Orrville, Ohio, is offering a 16-page booklet of questions and answers about automatic heating with a coal stoker. Questions answered include "How does a coal stoker operate?" Points to check in choosing an automatic coal stoker are listed. The various parts of the stoker are illustrated and described.

◆

308—Air Conditioning Manual

Wayne Oil Burner Corp., Fort Wayne, Indiana, is distributing a "Winter and Summer Air-Conditioning Manual"—36 pages of copy, charts and pictures—prepared to give the average layman a comprehensive picture of what air-conditioning is; how it functions; and what it costs to install and operate.

◆

309—Welding Aluminum

Aluminum Company of America, Pittsburgh, Pa., has recently issued a revised edition of its booklet entitled "Welding Aluminum," covering the welding of aluminum and its alloys. Fusion welding, torch welding, arc and resistance welding are subjects covered, as well as welded aluminum vessels and welding castings.

◆

310—Expansion-Type Conversion Burners

The Barber Gas Burner Company, 3702 Superior Avenue, Cleveland, Ohio, is distributing the new Barber Catalog 38, showing the diameter and adjustments for each particular model of the Barber round burner assemblies. Short nipples and longer vertical nipples enable the dealer to keep in stock assemblies which fit a wide range of both furnaces and boilers. Baffles are supplied to fit the maximum spread of the burner. Special span flame jets are also furnished which, when inserted, adjust the position of the flame.

◆

311—Window Conditioning

Libbey-Owens-Ford Glass Company, Toledo, Ohio, is distributing a 16-page booklet entitled Window Conditioning—double-glass insulation as the first step to winter comfort. Double glass insulates windows from the chill outside—it builds a wall of captive air as a barrier between the room and the weather. It keeps the inner windows warmer and thus checks at their source the drafts caused by chilled air dropping from cold glass surfaces to spread across the floor. They say window conditioning costs less than other desirable forms of insulation and saves more fuel for each dollar invested.

According to the results of a study of four representative houses in Metropolitan New York, made by Alfred J. Offner, consulting engineer, past president of the New York Society of Consulting Engineers and Treasurer of the ASH&VE, window conditioning will save approximately 23 percent of the fuel used in the typical uninsulated suburban residence. If these houses had been well insulated before they were window conditioned, Mr. Offner's figures show that of the remaining fuel cost for an insulated house, "Window Conditioning" would save from 30 to 36 percent.

The booklet shows how fuel savings will pay for window conditioning. With an FHA loan, the home owner need not use a penny of his own money.

The booklet is intended for consumer distribution.

ALDRICH

LEADS THE WORLD IN 1938 SALES—135% INCREASE OVER 1937—

Our dealers not bothered by chiselers. Easy to show a customer—they are Better Built—Easier to maintain.

11-Models, Capacity O-14 GPH, made by a prosperous Company that gives maximum dealer protection—WRITE

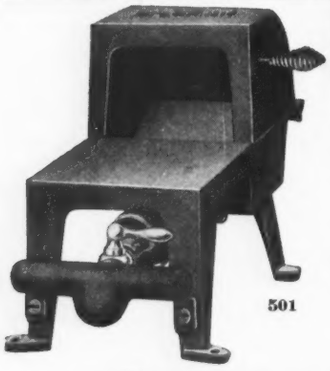
ALDRICH COMPANY · Peoria, Illinois

Rear View

NEW LOW PRICES on Air Flo "Weather Sealed" Shutters and Back Draft Dampers. We manufacture *Shutters*, Automatic, Manual Operation, Ball Bearing, Motor Driven, Stationary, etc. *Dampers*, Automatic, Ball Bearing, Motor Operated, Face, By Pass, Mixing, etc.

Attention Distributors and Representatives—your territory may be open. Write today.

AIR CONDITIONING PRODUCTS CO.
1230—18TH ST. DETROIT, MICH.

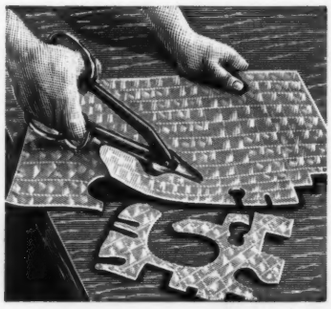


501

JOHNSON No. 501
Soldering Furnace Saves Money in Every Shop

You need no blower, forced air blast or muffle with this scientifically designed furnace, yet you get tremendous, uniform heat. The Patented JOHNSON Direct Jet Bunsen Burner gives amazing combustion efficiency with every kind of gas, to bring you continuous savings in operation. Heats soldering coppers up to 6 lbs. per pair, and does excellent heat treating of small metal tools and parts. Many other superior features. Write for free catalog at once.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA



WISS
SCROLL-PIVOTER SNIP

Cuts circles, scrolls and squares as easily as a straight line. Will cut alloy metals.

Now furnished with serrated blade unless otherwise ordered.

Use Wiss Hy-power and Bulldog Snips

J. WISS & SONS CO.
Established 1848 Newark, N. J.

There's an important message for you on the Inside Back Cover!

• • •

UNIFORM HIGH QUALITY
. . . at No Extra Cost

Ryerson certifies to the known uniform high quality of all steels in stock. Tighter, more accurate specifications—rigid inspection and checking—and years of preparation have built up stocks of these better steels. More than 25 kinds of sheets and all other steel products for the sheet metal worker are included. Special quality features and greater uniformity assure easy workability. When you need steel, order from the nearest Ryerson plant. Immediate Shipment is assured. Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Philadelphia, Cleveland, Buffalo, Boston, Jersey City.

RYERSON *Certified* **STEELS**

DOUBLE YOUR PROFITS THIS FALL WITH NEW PEERLESS FURNACES

—IMMEDIATE SHIPMENT FROM STOCK

There's still time to reap a harvest in furnace sales this fall! PEERLESS offers a complete line of coal, coke, oil and gas furnaces. Exactly what your customers want at prices they can afford. For beauty, fuel economy, low price and all-round efficiency there are no better values anywhere.—Everything from conventional round-type steel and cast iron furnaces to completely modern, streamlined, automatic winter air-conditioning units.—Write for literature and prices today. Plenty of time to make sales and installations before the snow flies. No delayed shipments when you deal with Peerless.

PEERLESS FOUNDRY CO., 1853 Ludlow Ave., Indianapolis, Ind.

How to Sell Furnaces and Repairs

WITH

The TORNADO Furnace Cleaner

The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

Dealers say that the TORNADO is the most powerful furnace cleaner built. Leads the field! Low price—easy payments—free trial. Approved by Anthracite Institute and Underwriters Lab. Thousands in use.

Write now for complete information.

Breuer Electric Mfg. Co.
5082 Ravenswood Avenue, Chicago, Ill.

Repair Parts
GUARANTEED TO FIT

BRAUER — REPAIR PARTS — STOVE, FURNACE, BOILER, OIL STOVE, RANGE

WE SPECIALIZE IN ORIGINAL REPAIR PARTS; THEY FIT BETTER

A. G. BRAUER SUPPLY CO.
316 North Third St. • St. Louis, Mo.

★ BUILT FOR PRODUCTION ★

MARSHALLTOWN

No. 0 BENCH PRESS

★ OPEN BACK ★ INCLINABLE! ★

This precision-built press has improved ball and socket connection—heavier construction—more die space and easier adjustment. Convertible clutch for single stroke or continuous operation.

Write today for literature and prices.

MARSHALLTOWN MFG. COMPANY
920 East Nevada Street
MARSHALLTOWN, IOWA

KEEP OLD MAN WINTER ON THE RUN

XX TH CENTURY HEATING & VENTILATING CO.
AKRON, OHIO

NO CONDUIT WORRIES

—or Expense, with the NEW
G-A LOW VOLTAGE CONTROL MOTOR

Now—a control motor that COSTS LESS TO BUY and LESS TO INSTALL. No conduit required under Underwriters' code, because this new Low-Voltage G-A Control Motor draws only 20 volts. Takes its current from a step-down transformer at the source of the 110-volt input. Recommended for all new installations and change overs. Comes complete with standard size thermostat and low-voltage cable. SEE your jobber, or WRITE today for full details.

WRITE TODAY

GLEASON AVERY, INC., 34 Clark St., Auburn, N. Y.

PORTABLE SHEARS

ALL-ALLOY

ALL-ALLOY No. 2 cuts up to ¼" steel plate.
ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.
Special blades may be had for shearing stainless steel.

FULLY GUARANTEED

BREMIL MFG. CO. Erie, Pa.

AVOID . . . Fall and Winter Smoke Complaints with NUDRY FURNACE CEMENT

No furnace man need have smoke complaints if he will use NU-DRY FURNACE CEMENT when setting up his furnace jobs this Fall and Winter.

Because—

It does not crack, bloat or powder when furnace is fired immediately after applied. Takes less material to set a furnace.

Will not shrink and keeps joints tight. No loss because it will not harden in container.

Send for free sample.

THE PYROLITE PRODUCTS CO.
1221-1231 W. 74th St., Cleveland, O.

ACME "Hot Spot" WELDERS

Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.

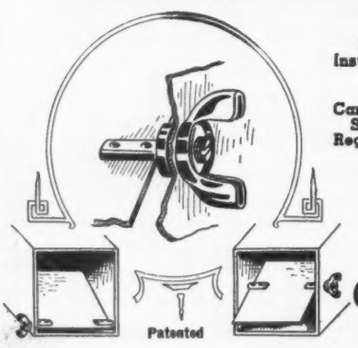
Write for literature and prices

Don't Rivet SPOTWELD! with an ACME
Lifetime Guarantee!

Complete range of sizes

ACME ELECTRIC WELDER CO.
Distributors in principal cities
5619 Pacific Blvd. Huntington Park, Calif. (Los Angeles County)

THE **GOESE** TIME SAVER
DAMPER CONTROL



Positive—Simplified

Less Labor to Install Insures Tight Vibration-less Job

Can be Used on either Flat, Square or Round Pipes Regular or Splitter Dampers

Screw Slot on Threaded Stud Shows Position of Damper. Bearings—Rust Proof Metal. Wing Nuts—Cadmium finished. Ask your Jobber.

Goese Mfg. Co.
2548 N. 18th Street
Milwaukee, Wis.

New Literature . . . .

For your convenience in obtaining copies of new literature, use the coupon on this page.

312—Net Trade Prices

International Heater Company, Utica, N. Y., is distributing net trade prices effective September 26.

◆

313—The Overhead Gascoaire

Gasconaire, Inc., 3255 Goldner Ave., Detroit, is distributing a four-page folder illustrating and describing the Overhead Gasconaire—a new gas heating and air conditioning plant suspended from the basement ceiling, with electric ignition. May also be installed in the attic, beneath the floor or in a utility room.

◆

314—Prefabricated Ducts and Fittings

Cincinnati Sheet Metal and Roofing Company, 230 East Front St., Cincinnati, Ohio, is distributing a 16-page catalog covering Ajax prefabricated ducts and fittings for forced air and air conditioning installations. Layouts included illustrate a standard trunk line assembly with square trunk and square branch leads and fittings, and a square to round transformer takeoffs.

◆

315—Steel Buyers' Guide

Joseph T. Ryerson & Son, Inc., Chicago, is distributing a handy pocket-size book which gives complete listings and descriptions of the wide range of certified steels and allied products carried in stock for immediate shipment. Included in this stock list are handy reference tables, weight charts, standard specification listings, etc. Among the products described are beams, channels, angles, plates, bars, strip steel, cold finished bars, alloys, tool steels, flat wire, stainless steel, mechanical and boiler tubing, welding rod and wire, bolts, rivets, etc.

◆

316—Heating Slide Rule

The Climatemaker Corporation, 1804 West End Avenue, Nashville, Tennessee, offers the Climatemaker slide rule for heating contractors, complete with instructions for operating, and heat loss calculating form.

They say the rule figures heat losses from buildings, quickly and accurately, and gives the answers in Btu, cfm, pipe area, pipe size and stack size; square feet of steam and hot water radiation; and, for gravity warm air heating, inches of leader pipe area, pipe area, pipe size and stack size, for first, second and third floor rooms.

Eleven operations (additions, multiplications or divisions) are saved.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature."

(Circle numbers in which you are interested):

212	213	214	215	216	217	218
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226						
306	307	308	309	310	311	312
313	314	315	316			

Name ..... Title .....

Company .....

Address .....

Are you Manufacturer——Jobber——Dealer——

ONE QUALITY ONLY

There is no "second grade" . . . no inferior quality of Lyonore Metal. Made according to a proven scientific formula owned by us, only one grade is manufactured. Be assured of years of satisfaction by specifying and using genuine Lyonore Metal for all sheet metal work. Ask for complete details.

LYON, CONKLIN & CO., Inc.
Baltimore, Maryland

Lyonore Metal

CHROMIUM — NICKEL — COPPER — IRON ALLOY

PAR C-8

AUTOMATIC OIL BURNER

1. First cost on Oil Burner is low. Needs no extra fire brick or precast combustion fire chamber.
2. Low service cost. Only one moving part.
3. Restoration bond. Insuring life of burner.
4. Finished appearance. Compact design.
5. No nozzles to clog or leak. No wicks to deteriorate. No complicated ignition apparatus to fail.
6. Quiet as a kitten. No "puffbacks."
7. No loud report when coming to high flame.
8. No tank hum when installed.

Here's a real heating unit for those hard to sell prospects. Write today for more information.

PAR APPLIANCES, INC.
(Affiliated with The La Crosse Tractor Company)
LA CROSSE, WISCONSIN

FUEL SAVING and BETTER HEAT

WILL *Sell*

THESE BRUSHES

Furnace and Boiler cleaning is an important factor in every home heating plant. The new Schaefer RUSTPROOF FLUE AND FURNACE BRUSHES offer YEARS of efficient service at a price only slightly higher than the cheap profitless brushes you have been selling. Fast-cleaning wire bristles are made of a special Silvery Brite special alloy steel, thoroughly RUSTPROOF, not merely treated with rustproofing solution. Here's Quality that will sell—at a margin of profit worthwhile to you. Let us tell you of the aggressive Merchandising Plan behind Schaefer Rustproof Flue and Furnace Brushes.

- Above No. 39 Boiler Brush
- Right No. 442 Round Furnace Brush

SCHAEFER BRUSH MFG. CO.
117 West Walker St., Milwaukee, Wis.

SCHAEFER BRUSHES
BUY SCHAEFER-IT'S SAFER

PLAN BIGGER and BETTER PROFITS with a KENT DOUBLE SUCTION

Kent Double Suction Furnace Cleaner

The time has come when you plan bigger and better results with your furnace cleaning work. Play Safe with a Kent, the furnace cleaner of

GREATER SPEED
GREATER POWER
GREATER EFFICIENCY

Give better service; then Clean Up the PROFITS when you clean out the dirt.

Write us today.

THE KENT COMPANY, INC.
(25 KENT YEARS)

167 Canal St. Rome, N. Y.

ELCON TYPE

Get our prices on Automatic Shutters, Hand Operated Shutters, Ceiling Dampers, Balanced and Back Draft Dampers.

Elgo Ventilating Specialties

Stationary Shutter

An all-steel shutter with stationary blades at an angle of 45 degrees, which prevents birds, leaves and other matter from entering. Used both for intake and exhaust ventilation in industrial, commercial and residential buildings. Sizes from 10" to 60" square—also rectangular.

Write for circular and prices!

ELGO SHUTTER & MANUFACTURING CO.
634 W. Warren Detroit, Mich.

Free CATALOG

CHECK YOUR HEATING INSTALLATIONS WITH THE "ALNOR" VELOMETER

This all-purpose air velocity meter indicates air velocities directly and instantaneously on the scale in f.p.m. without the necessity of timing or mathematical calculations. Standard range 0-300, 0-3000 f.p.m. Other ranges available up to 18,000 f.p.m.

Write us today for a folder giving more complete information.

ILLINOIS TESTING LABORATORIES, INC.
412 N. LaSalle Street Chicago, Illinois

Air Conditioning

—What happens between two rooms, one having a six minute air change, and the adjoining room a twelve minute air change?

—Can you install a thermostat control system properly?

The answers to these and hundreds of other mechanical questions about air conditioning are appearing in the monthly *Air Conditioning Section* of AMERICAN ARTISAN.

If you do not now get the ARTISAN, send us $2 and we will enter your subscription for a full year—12 consecutive issues. Your subscription will yield a rich harvest of money making ideas and solutions to many mechanical problems connected with warm air heating and sheet metal contracting.

AMERICAN ARTISAN
6 North Michigan Ave. Chicago, Ill.

"BB" QUALITY

Order from your jobber

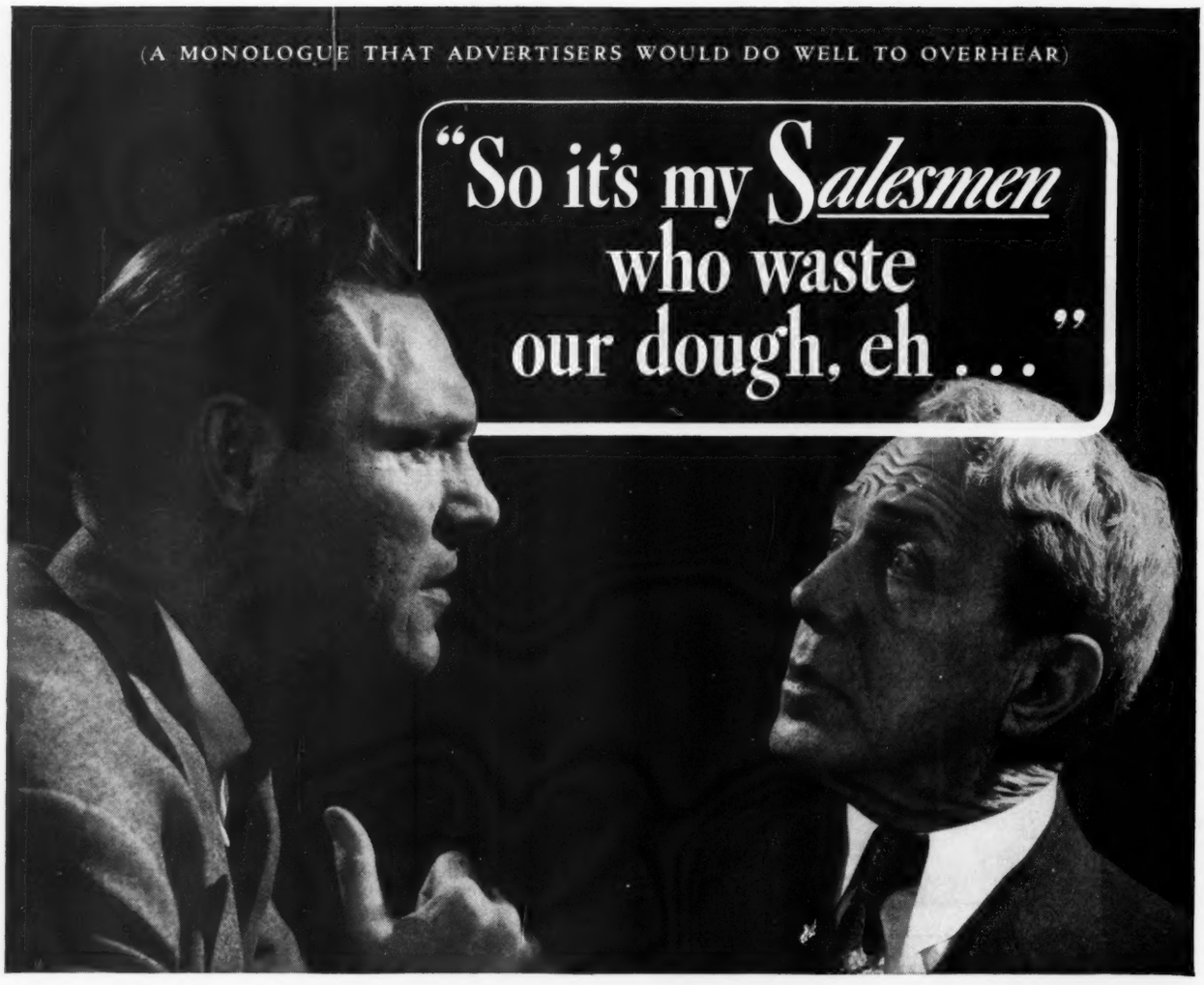
Saves time and labor

"BB" SPRING CIRCLE CLIP

Furnished only with "BB" Circles at no extra charge over old style straps.

BERGER BROTHERS CO.
229-237 Arch Street, Philadelphia, Pa.

(A MONOLOGUE THAT ADVERTISERS WOULD DO WELL TO OVERHEAR)



roared the Sales Manager to the Treasurer . . .

"I think our salesmen's 'swindle sheets' are too high, do you? Claim they should spend money only on prime prospects, hey? Well then, why don't we do the same with our advertising appropriation?

"You tell me that every cigar a salesman hands out these days should bring in an order, and I'm telling you that more of our advertising money should be concentrated in the warm air heating, air conditioning and sheet metal contracting field . . . to cultivate the men our salesmen have to sell. For instance, let's make sure we're doing an impressive job in AMERICAN ARTISAN, the publication that our prospects look to for progressive ideas and dependable news. That'll give us what we need *right now:* selling help *where it counts,* at less cost than a cheap cigar per prospect.

"If you'll switch a bigger chunk of our advertising budget to AMERICAN ARTISAN, I'll confine my sales expense to our hot prospects." 99

"Okay, wild man," said Treasurer MacTavish, "it's a deal!"

Highest editorial standards and publishing integrity.

ABP **AMERICAN ARTISAN** ABC

bears the twin hall-marks of known value

Proved reader interest in terms of paid circulation.

Classified

SITUATIONS OPEN

HEATING SALESMAN WANTED—We have openings for five thoroughly experienced heating salesmen. Do not apply unless your experience covers calculating heat losses, laying out forced air heating systems, servicing coal, oil and gas fired units. Address The Rudy Furnace Company, Dowagiac, Mich.

Experienced furnace and air conditioning salesman wanted. We have several atractive openings in our sales department, both in the East and in the West, for aggressive sales engineers who know how to sell warm air furnaces and air conditioning equipment to dealers. Write us fully about your qualifications and where you can conveniently meet us for a personal interview. ADDRESS LENNOX FURNACE CO., INC., 400 N. MIDLER AVE., CYRACUSE, NEW YORK.

SITUATIONS WANTED

Competent sheet metal worker, estimator and layout. 22 years' experience. Age 40. Address Key No. 443, American Artisan, 6 No. Michigan Avenue, Chicago, Ill.

WANTED

WANTED—Special Wrenches for repairing door checks. Address, Frank DeWeese, 610 South Clinton, Fort Wayne, Indiana.

WANTED—Manufacturers' representatives and agents—by Manufacturer of complete line of blowers, air washers, propeller fans, unit heaters, furnace blowers, etc. Give details, territories now working and other lines you now are handling. Address Key No. 442, American Artisan, 6 No. Michigan Ave., Chicago, Ill.

MISCELLANEOUS

Small heating and plumbing business, in village of about 600, for lease or would consider co-operative basis. Good opening for Master Plumber. Owner deceased. Widow sole owner. Address Mrs. John C. Loyd, Paw Paw, Illinois.

Manufacturers Agents

MANUFACTURERS WANTING ADditional representation often come to us for names of prospective agents now handling other lines in this field on a commission basis in a definite territory. It will pay you to be on record with us so we can refer your name to interested manufacturers. No charge or obligation, of course. It is a service we render free to manufacturers and representative. Just drop a line that you are interested in being on file and we will send you form to fill out. Address American Artisan, 6 N. Michigan Ave., Chicago. Ill

Use AMERICAN ARTISAN Classified Advertising for quick results. It puts you in direct touch with the buyers and sellers in the warm air heating, sheet metal contracting and air conditioning industry.

AMERICAN ARTISAN Service Section

CUT YOUR COSTS by Spot Welding

WITH **ACE** SPOT WELDERS

Cheaper, better and faster than riveting.

Built for production service. Engineered to meet practical requirements of sheet metal shops. Made in sizes from 5 K. W. up.

Only **$90**

for Series 62. Welds 2 pcs. 16 Ga. Steel. Send for free literature.

PIER EQUIPMENT MFG. CO.
Welding Equipment Division
725 Cross St., Benton Harbor, Michigan

YOU
Can double the usual savings.

WE
would be pleased to mail you our latest stock list covering everything in metal working machinery — listing many real bargains in our huge stock of more than 2000 machines of all makes, models, types and sizes.

INTERSTATE MACHINERY CO., INC.
107 S. Clinton St., Chicago
(Free Parking)

SHAMBLEN SERVICE

is known throughout the trade. Your order filled when and how you want it and with parts that are guaranteed to fit.

Try us with your next repair job. Our service and repair parts cannot be excelled. No order too large, none too small. Write today for catalog and further particulars.

SHAMBLEN FURNACE PARTS COMPANY
231-39 First Avenue Pittsburgh, Pa.

"DO-ALL" Combination Electric Hammer & Drill

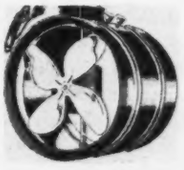
drills both concrete and metal. Cap. 1½" in concrete—⅝" in metal. Saves time and money in setting expansion bolts, anchors and plugs. Soon pays for itself. Easy to maintain. Bulletin 381. **Wodack Electric Tool Corporation, 4644 W. Huron St., Chicago, Ill.**

BEVERLY THROATLESS SHEARS

are indispensable to the modern, up to date sheet metal shop. Light, portable, yet extremely strong, they will make your shearing operations much faster, neater and more economical thru time saved on the job. They are made in two sizes to handle up to 14 or 10 gauge metal and are very reasonably priced.

Write today for literature and prices.

BEVERLY SHEAR CO.
1009 W. 110TH PLACE, DEPT. 3, CHICAGO



THE Cold Room problem can be solved by using a *One Pipe Booster* Fan to force warm air into the room. May also be used in cold air returns. Easily installed. Made in all sizes. Furnished either with plain mounting or encased, as illustrated. Variable speeds may be had by using our *Control* Box which fits any model Booster Fan since 1933.

Write for prices and literature.

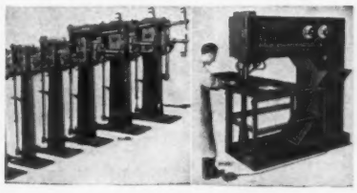
Brumme Manufacturing Co.
314 S. Artesian Ave. Chicago, Ill.

CLEAN AIR ASSURES CLEAN INTERIORS

Smoked and sooty walls, ruined furnishings, soiled drapes are prevented by the use of Annis Air Filters in the forced draft heating system.
Thousands of beautiful homes are protected by this simple, inexpensive method.

Write for descriptive bulletins.

ANNIS AIR FILTERS
1515 Gardena Ave., Glendale, Calif.



Electric welding equipment of every description to weld from a watch case to a door. Also special welding machines, spot, butt, seam, a. c. arc welders in sizes from ⅛ to 500 KVA. Ask for our catalog No. 38-WT. Also production job welding.

EISLER ENGINEERING CO., Inc.
761 S. 13th St. NEWARK, N. J

SERVICE SECTION: Rates for display space similar to above in Service Section are $5.00 per inch per insertion. One-inch minimum space accepted. **Classified Section:** Rates for classified advertising are 5 cents for each word including heading and address. Count seven words for keyed address. Minimum $1.00 for each insertion. Cash must accompany order.

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The January 1939 ANNUAL DIRECTORY NUMBER

MARKING the beginning of its 59th year of service to the warm air heating, sheet metal, and residential air conditioning field, AMERICAN ARTISAN will again publish next January a large, effort is being pointed towards making the January 1939 number the largest and most useful issue of special directory number. Work on this important issue is already well under way, and every AMERICAN ARTISAN ever published.

The outstanding feature which you have come to know and to look for every January, will be the 7th Annual Equipment Directory, containing complete and up-to-date listings of all warm air heating, sheet metal, and residential air conditioning products, their trade names, and the names and street and city addresses of all manufacturers. Use the new Directory, as you have the previous ones, to speed and simplify your buying of supplies and equipment during 1939. Every product you will need, every trade name you may want to look up, every manufacturer you may wish to contact will be listed so you can find them on an instant's notice.

As in every other issue throughout the year there will be a large selection of outstanding articles on important warm air heating, sheet metal, and air conditioning design, fabrication, and installation problems . . . articles as helpful, authoritative, and as numerous as those you get in every other issue during the year.

The big January 1939 number with the new Directory, and many timely and practical articles will reach you about the middle of January. Watch for it. Make full use of each of its three valuable features.

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Here is a monthly issue—and it comes only ONCE a year—in which your advertising lives ALL YEAR. After they have studied its many articles and data dealing with current problems, thousands of contractors and wholesalers will preserve the January 1939 issue for eleven months more . . . to use as a buying and specifying guide. Many will turn to the advertising pages seeking additional information about your products after finding them listed in the Directory Section. Make it easier for them to order from you—a full showing of your line. Space the same as for any other issue.

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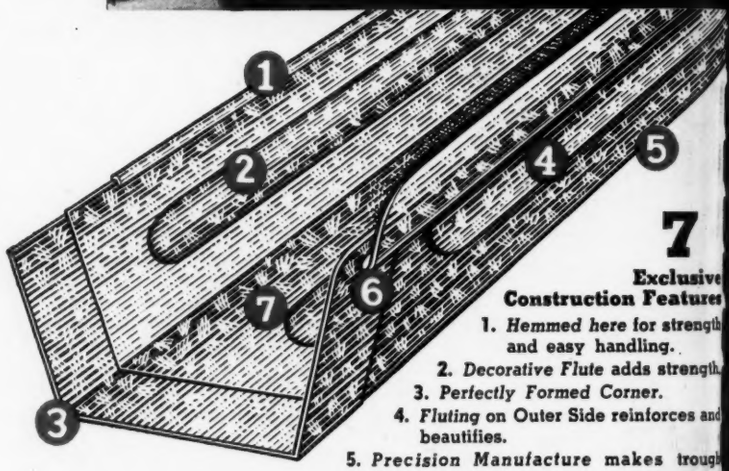

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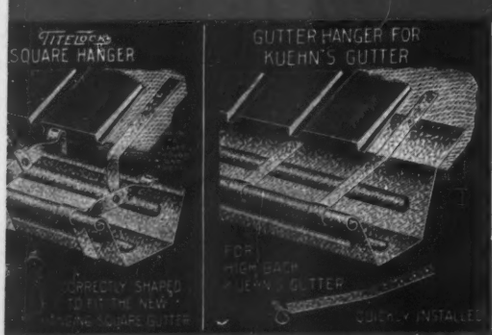

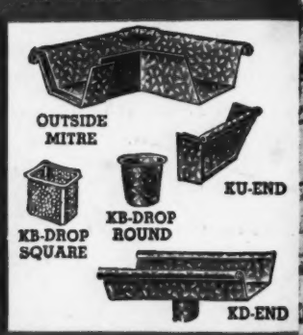

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